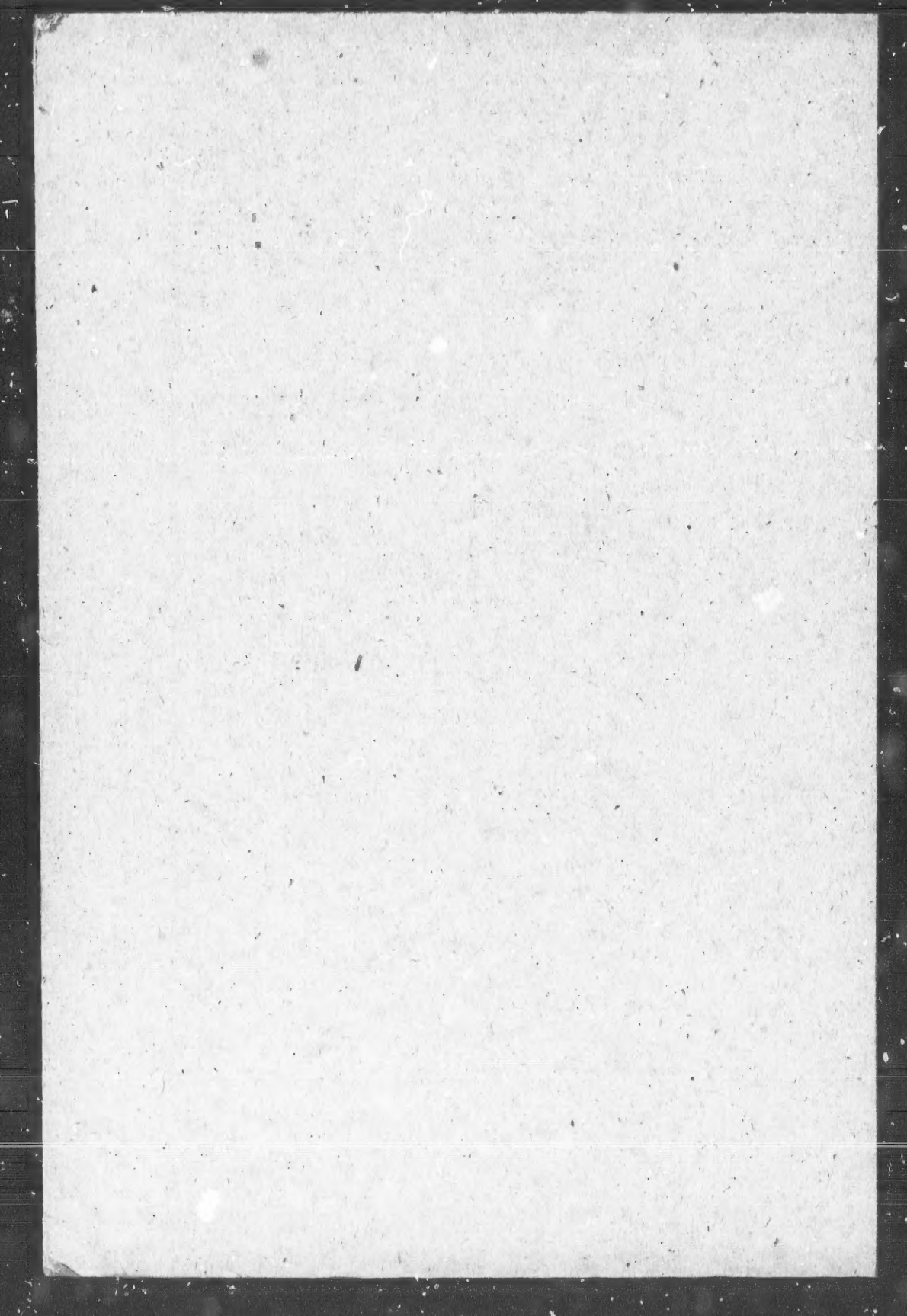




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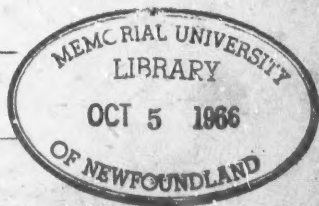
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REPORT

ON THE

Cure of Codfish and Herring,

By AD. NIELSEN.



ST. JOHN'S, N. F.:
PRINTED AT THE "EVENING HERALD" OFFICE.

1890.

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On the Cure of Codfish and Herring.

By AD. NIELSEN.

PART I.--CURE OF CODFISH.

INTRODUCTORY.

In writing on the cure of codfish, I do not claim to present anything new to experienced curers or people acquainted with the fisheries and the cure of fish, but my object is just to describe the different ways of curing fish in other countries, where such is carried out to any extent, in order to give those who have not had an opportunity of making themselves acquainted with foreign methods, an idea of how those are carried out and to enable them to compare their modes of curing fish with the cure of Newfoundland. Although any of the other nations' methods of cure, in full, would not answer here, because the cure of fish must be regulated chiefly according to the weather and the different latitudes in which the fish is to be cured; still by having them presented, we have a chance to extract from them many hints which, if adopted, perhaps may be of great advantage to the Newfoundland cure; and this, in my opinion, is a step in the right direction, which, no doubt, will lead to improvements. I am aware that in almost all countries we will find some people who think that their own methods of cure are the best, the most suitable, and cannot be improved; nevertheless, it is not safe to depend too much upon such a narrow view; because at the present time, with a strong competition and large amounts of public money expended every year on improvements of the fishery industry in almost every country, we must expect that something may be gained in the way of knowledge and progress, and that by holding such an idea we may be outstripped.

by other nations and perhaps not recognize this until rather too late. With these views I venture to give an account of the cure of codfish as it is carried out in some of the principal fishing countries, and at the same time express my opinion on the cure in general, as far as it can be given on an undefined subject, according to my knowledge, gained by practical experience in the fishing industry, travel and study in foreign countries, and in connection with the fishery society in Norway. I shall specially refer to the knowledge this important and high-standing institution has gained by its long, skilful and expensive investigations into these matters.

FUNDAMENTAL PRINCIPLES.

In curing codfish with salt, two fundamental methods are adopted: The pickle cure and the kench cure. The various other methods brought forth from these are generally due to the diversity in the climate in different countries. What will suit one country may not answer another and its markets. Although the quality of the fish itself may vary somewhat in the different countries, still the good cure of fish does not depend entirely on in what countries it is accomplished. Good fish can be made even in countries with an unfavorable climate. The main principle is, no matter whether the cure is Newfoundland, American or European, that the methods of cure are carried out fully with the utmost care. Without a careful treatment in the different stages in the cure of fish, a good article cannot be obtained. This is the great rule in the cure of all kinds of fish, and cannot too often be repeated.

Water, air and heat are necessary conditions to cause a *putrefaction*. Where one of these is left out or not present in sufficient quantity, no deterioration will take place. Food articles do not putrefy in a vacuum, nor in a temperature below a certain degree of heat. On these principles the hermetically sealed preservation of food articles, and the use of ice and the cool air system, are founded. Articles such as dry meat and fish will also keep fresh for years, when the amount of water these articles contain does not exceed the normal quantity.

USE OF SALT.

The object of using salt and drying as a preservative, is to diminish the amount of water in these articles. This can be done in regard to cure of codfish in three ways—either by salt, by air or by pressing. For instance, a codfish can be cured as hard as the best dried fish, by only re-salting it with dry salt several times, with due intervals. By curing fish in the air, without salt, the same object is

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attained, and by pressing, a durable article can be had, although this will be a less nutritive product. But the salting has also another effect. The salt, by working into the cellular tissues, formerly filled with juice, shuts up all the pores and fine openings, thus preventing the intrusion of the air, and at the same time checks the development of the bacteria of putrefication.

Fresh codfish contain 81.98 per cent. of water and 1.44 per cent. of salt.

Salted codfish contain 49.72 per cent of water and 20.53 per cent. of salt.

Stockfish contain 16.16 per cent. of water and 1.56 per cent. of salt.

Of the 20.53 per cent. salt, a salted codfish contains 18.75 per cent. is chloride of sodium (common salt). A well-cured boneless codfish contains 36.82 per cent. of water, and 15.5 per cent. of chloride of sodium. Some of the water is drawn out by the salt, which reduces the water a fresh fish contains from 81.98 per cent. to 47.7 per cent. Some is drawn out by the air and some by pressing, which, at the same time, also drives out a portion of the salt. A fresh codfish weighing 6.6 pounds, contains 5.4 pounds of water, but will, when it is well cured, only contain about one pound, the 4.4 pounds being removed from it during the cure. Its whole weight, when properly cured, will be about 2.2 pounds, of which 16.7 ounces mostly are nutritive substance, 4.4 ounces are salt, and 12.8 ounces are water.

The above-mentioned means, by which the water is extracted from the fish, is carried out to a different extent in the various countries. In some countries more salt is used, in others the fish is dried hard, and again, others use more pressing—all according to the condition of the climate and the markets the fish is prepared for. In countries where the air is warm and dry, very little pressing is used, and what little is applied during the cure is merely for the purpose of giving the fish a smooth surface. What pressing is used after the cure, is done with the view of promoting the fermentation process; while in other countries, where the climate is cool and damp, the pressing of the fish is an essential part of the cure. If the fish has to lie only a short time in salt, finer salt, and in larger quantities, has to be used. On the other hand, should the fish remain a long time in salt over the ordinary, coarse salt should be used.

To what extent the water has to be extracted from the fish depends upon the time in which the producer considers that the product will be consumed. The great matter to be kept in view, as well with this as with all kinds of cure, is that the cure be such that the flavor,

look or appearance, and the nutritive value of the fish shall be preserved. To ship soft or not properly dried fish to a market is only allowable when the shipper is assured of that his fish will be consumed immediately. Such fish brings as well to the purchaser as the shipper or producer, a better profit, because the former gets a better and sweeter article, while the latter gains by getting a better weight and having less labor on his fish. But when such matters are to be taken into consideration, that the fish has to be shipped to hot climates, and perhaps remain there for a long time before it can be sold, the distance long and communication slow, and that perhaps some of this fish has to be shipped away in the hot season, the principal object must be to get as durable an article as possible. The value of a fish depends upon its appearance and its durability, but those can be quite independent of each other. A fish that has got a poor appearance may be a durable article, although its value is lessened on account of its poor look; while an external good appearance is not always a sign of durability. In the cure of a commercial article for the emporiums, both objects must be kept in view. The profit that may be made once in a while, through lucky combinations, by paying little attention to durability, is trifling in comparison with the loss that arises when the fish is damaged in stock. If the raw product, salt and fitting out expenses are taken as the normal value, the difference in labour or weight, by a more or less careful cure, is too small in proportion to the risk one has to run. The principles given here for the cure of codfish comprehend as well the appearance as the durability; besides they must be considered from an absolute point of view, without regard to when, where or how the producer gets his articles disposed off.

THE RAW PRODUCT.

The first proviso brought forth with the view of getting a good article is, that the raw product or fish must be perfectly fresh. In many countries, especially those where the shore fisheries are carried on in the winter time, natural circumstances, such as constantly stormy weather, cause that a large amount of fish may be left standing over for days in the water on trawls or in nets. Such fish can never be made into a first class article. When cured it also gives a smaller weight. It generally gets of a dark colour; the flesh gets loose and cracky, especially near the backbone; the skin loosens from the napes; the ribs turn red; the belly gets thin and red; and the oil, that very soon separates itself from the liver, causes dark stripes along the abdomen of the fish. The longer the fish has been left standing on the gear the more these faults will make their appearance. Fish left standing in nets will be more damaged than fish left standing on trawls. Fish taken from trawls, and partly also from

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nets, which have not been left over more than two days can, with a careful cure, be made into a good article, if the temperature of the water was not too high. But the difference between such fish and fish cured fresh, is already so great that a reduction in the price of the former ought to be made. Fish that have been left over more than two days on the gear will only make a second class article or refuse.

HANDLING FISH.

The manner in which the fishermen handle their fish has also an influence on the quality. The fish ought not to be stepped on, subjected to kicks or blows, nor exposed to the weather; it should be covered up as soon as it comes out of the water with planks, old canvas or tarpaulines.

THE BLEEDING OF THE FISH.

The next proviso is that the fish be bled as soon as possible, after been taken out of the water, or at least before the cadaverous rigidity sets in, for the purpose of getting the most possible blood out of the fish, by means of which it sets a fine white colour when cured. The bleeding of a fish is done by cutting the throat and the large blood vein that lies close to the back and neck bone. To accelerate a speedy death of the fish the neck-bone should also be broken across. The blood with its ingredients is subject to a more rapid corruption than any other substance a fish contains, and if not removed before the cadaverous rigidity sets in (at which stage the process of corruption already begins) it will be transmitted to the pores in the flesh and thus injure the fish. After the corruptive blood ingredients have once affected the flesh of the fish, its colour turns dark, and the salt has not the power to again restore to the flesh the white colour it would have obtained, if the blood was removed while the fish yet showed signs of life. Although all acknowledge that the bleeding of the fish raises the value of the product, yet it is not carried out to the extent it ought. As far as I am aware, this process is only used by the French, Belgians, the Dutch, Scotch and the Icelanders, and some Norwegians, when the fishery is carried on by handline from boats or vessels. Wherever there is an opportunity the fish should be bled as soon as it is caught. It causes no waste of time in handline fishing, because this can be done while the fishing-line is running down to the bottom, but it is sure to increase the value of the product. It causes, in the mean time, a little more work, wherefore a little higher price should be paid for fish treated in this manner to encourage the fishermen to take that little trouble with their fish.

On board of a vessel the bled fish ought to be salted in a separate bin for the purpose of not mixing it with fish that is not bled, and it

should also be cured by itself inshore; as this fish, when properly taken care of, will give a better quality than the other fish. Of course the bleeding is of no use after the fish has been dead so long that the blood has ceased to run

WASHING OF THE FISH.

If a good product is to be obtained the fish must be washed well before it is put in salt; especially must the parts around the neck and the outer parts of the back-bone which is left be cleansed well from bloody substances. Special attention should also be paid to the cleansing of the fish underneath the dorsal fins, where always a lot of slime is gathered. All blood left in the back-bone ought to be removed. This can partly be done by pressing it out with the thumb. The French use a spoon for the purpose of taking the blood out from this remaining part of the back-bone.

In Norway some of the fishcurers hold the opinion that the fish when cured gives a smaller weight if it is washed before it is put in salt. Some therefore wash their fish round after it is headed and gutted before they split it; others again never wash their fish before it is salted but leave the washing entirely until it is taken from the salt for the purpose of drying. But they all agree that a better looking and whiter fish will be had when it is washed before it is put in salt. After the fish is washed in clean water it should be laid aside in order to give the water a chance to run off before it is put in salt. That the washing of the fish before salting should have any injurious influence, as I have heard some claim, is not likely, because the time in which the fish comes in contact with the water is too short to have any influence even on substances which dissolve themselves in cold water. On the other hand, even if this was the case, it would be trifling compared with the influence the brine has got in that respect. The only loss in weight of fish that was washed before it was salted, which I have observed, was in a red coloured very watery codfish caught on the north coast of Iceland. Such watery fish with very loose flesh, will dry up quicker in the salt, if washed before it is salted, than fish of the same kind which has not been washed before being salted, if it is left in the salt for a month or two, and a loss in the weight of the washed fish will thus occur when the fish is taken from the salt green; but the difference in the weight of such fish when cured, is insignificant.

What labour is bestowed on the fish by washing it before it is put in salt is gained again in the washing out of the fish, after taking it from the salt, for curing purposes, because it is then so much easier to cleanse it from slime and bloody matter.

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FROZEN FISH.

If the fish is split and salted while frozen hard it will be liable to decay, and will only give refuse fish. It must therefore always be thawed in seawater before it is split, but should not be left any longer time in the water than necessary, usually one or two hours are enough. To thaw frozen fish in brine is recommendable. If the fish is fresh it does not appear that the frost has any injurious effect after it has been thawed; but if it has been left on the gear in the water for two days it will turn out slack and will crack, and, as a rule, only give refuse fish. Fish salted down frozen will only give refuse fish.

SPLITTING OF FISH.

The neat shape and good appearance of fish depend much upon it being properly split. Care should therefore be taken that the fish do not get damaged during the act of splitting. Especially care should be taken with fish that has been long hanging for some time in nets or on trawls, because the flesh of such fish is softer and looser than that of entirely fresh fish. The knives should be kept well sharpened in order to give the fish a clean cut. The knife should be passed close to and along the back-bone, so that no flesh adheres to the bone, and should not go deeper into the flesh than to the upper part of the whirls, otherwise the fish will be too much cloven and will become thin through the back when pressed. The fish should also always be split right out to the tail. The back-bone should be cut slantways, at least three joints below the vent, in such manner that the cut passes through two or three joints, thus allowing the blood-bone to come out and the peaked bone to strengthen that part of the fish. In Norway the back-bone is generally cut 28 to 30 joints from the tail. The cut ought not to be made so deep that the strings which lie along the upper side of the back-bone get damaged, as these should be left in order to strengthen the fish further along the back.

THE SALTING OF CODFISH.

In curing fish with salt two methods are generally in use; 1, The pickle cure where the fish is salted in tight vessels capable of carrying the brine; 2, The Kench-cure, where the fish is salted in bins or kenches, allowing the brine to run off from the fish.

THE PICKLE CURE.

This mode of cure is mostly used in Scotland, Belgium, the United States, and, to a small extent, also in most fishing countries. In the United States the most of the fish is put up as boneless fish.

In Scotland and many other countries it is cured dry after being a sufficient time in the pickle; while in Belgium and Holland, partly also in Sweeden and Norway, it is salted in barrels, and sold in pickle in the European markets by the name of "Laberdan." The pickle-cured fish gives the best and finest looking article, but is more difficult to cure, requires a dry climate and a rapid sale. Thus it is not suitable for exports to warm countries, or to keep any length of time in stock. The salting of such fish must be done more carefully than many assume, especially in a country where the climate is damp, if a good and well-cured article is to be obtained. In several places in Newfoundland where I have been, I notice that many of the fishermen pickle-salt their fish in tight puncheons; but the most of this fish that I have seen has been spoiled in this pickle, and would never turn out to be a good or first-class fish when cured. The reason why this fish gets spoiled in the pickle is, that it is not salted in the proper manner. It may therefore be well to remark, that if the fish is going to be salted in puncheons capable of holding the pickle, a heap of salt should be placed on top of the uppermost layer of fish in each puncheon in order to strengthen the weak pickle or brine that floats up to the surface and thus prevent the fish from being damaged. If fish is salted in tight vessels the brine will weaken according as the salt it contains works into the fish; the weakest pickle (which is the lightest) will float up to the surface, and if there is not sufficient salt put on the top of the uppermost layer of fish to strengthen *this weak pickle*, it will turn sour in a short time and damage the fish throughout the whole puncheon. Pickle for curing fish should have a strength of $12\frac{1}{2}$ degrees Beaumes' hydrometer scale, at 60 degrees Farenheit, which will answer to the point at which a raw potato will float. Any weaker pickle applied than this is liable to spoil the fish within a short time.

THE KENCH CURE.

This is the most common way of curing fish in the large fishing countries and gives the most durable article (when properly cured) for export to hot climates. The principle of this mode of cure or salting is, to allow the pickle that gathers on the fish to escape, leaving the fish dry. Before salting the fish in bins or kenchs, the water left on the fish after being washed should be allowed to run off well. In placing the fish in kenchs it ought to be well stretched out in order to leave no folds or wrinkles, because what wrinkles the fish obtains in the kenchs are afterwards hard to get out, and also cause more work. Care should also be taken that the abdomens do not come in contact with the intercepted back-bone. The kenchs should be made a little higher in the middle in order to give the pickle a

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chance to run off from the fish. In countries where the most of the fish is sold green out of the vessel, and the fishermen's shares are made up according to the weight of fish landed (such as for example, is the case in the United States), cure salters generally build their kenches low in the middle in order to keep the brine in the kenches and thus get a heavy weight of their fish landed. This does not matter much where the fish after being taken out of the vessel are put in pickle until they are ready for preparing it as boneless fish, or fish cured for speedy consumption; but in countries where the fish is to be cured hard as a durable article, fit for export to southern and hot countries, this trick is objectionable, because it renders the fish more difficult to cure afterwards, and besides it makes the purchaser of such fish pay for a considerable quantity of water instead of fish (as pickled fish contain a larger per centage of water than dry salted fish) which again has to be extracted from the fish during the process of drying. Purchasers of such fish ought therefore to take this into consideration, and also pay attention to whether the pickle is perfectly sweet or not. Fish which have to be cured perfectly hard should not be left in salt (and especially pickle) for a greater length of time than is just necessary for the salt to work through it.

SALTING.

In salting fish care ought to be taken that the salt be distributed in *equal quantities* over the whole layer, and in proportion to the thickness of the fish, so that some parts of the fish will not get too much salt and thus become salt-burnt, while other parts get too little and thus turn sour, which is often the case. Re-salting of fish in kenches is very much in use by the Icelanders, and also on board many of the English fishing vessels. The Icelanders whose fish fetch a high price in the Spanish markets, are using one barrel of Liverpool salt to three quintals of dry fish in this first salting. After the fish has lain in salt for three days it is resalted in new kenches, with $\frac{1}{2}$ brl. of salt to the same quantity of fish. In this salt the fish remain for another three or four days, after which time they consider the fish ready for washing out and drying. Re-salting of fish in kenches is no doubt recommendable in cases where weak salt is applied and the fish liable to turn sour, but although the English and Icelanders use this method it is doubtful whether outside of such cases it will pay the expenses of salt and extra labour, or give any better article.

KINDS OF SALT.

In regard to what kind of salt is preferable for salting codfish there are different opinions. Some hold that weak and small-grained salt gives the finest fish, others again hold that the stronger and not

the small salt is better. To give any certain rules in regard to what kind of salt is the best for salting purposes, is difficult. It depends largely on the size and condition of the fish; on the climate; and how long a time the fish is intended to remain in the salt. In selection of salt the principal thing to look at is that the salt is clean, even, and has a suitable size. Bright-looking salt is generally considered to be good for salting fish with. Uneven-grained salt is not recommendable, because the larger lumps will remain unmelted, and are liable to burn the fish; or make it specked in places where it remains. To such fish as are going to remain a long time in salt, a little large-grained, and not so easily dissolvable salt, is preferable. Formerly the French gray salt was considered the best in Norway, but now Cadiz. St. Ybes and Trapani salt are mostly in use. The Scotch and Icelanders use Liverpool salt, the Canadians use large Liverpool salt, in the cold season, to their large fish; and small Cadiz salt in summer to their smaller fish. In the United States the Trapani salt is mostly used, and preferred to the Cadiz salt, on account of the reddish plant (*clathrocyllis roseo persicina*) which often occurs in this salt. This plant gives the fish a redish colour and at the same time accelerates a rapid process of putrefaction. Dampness and heat are the necessary conditions for the development of this plant, especially heat. The French who fish on the Banks of Newfoundland use St. Ybes and Cadiz salt, and in Newfoundland as far as I am aware, Cadiz and Portugal salt partly, also Liverpool salt, is used and some little West India. It is seen by this that the most customary sorts of salt in use for codfish are Cadiz, St. Ybes, Lisbon, Liverpool and Trapani salt. These different sorts of salt here mentioned contain, according to analysis made by Professor Waage, about the same quantity of chloride of sodium (common salt).

Liverpool	Salt contains	92.7	per cent.	} Chloride of Sodium.
Lisbon	" "	91.2	"	
Trapani	" "	90.4	"	
Cadiz	" "	87.5	"	
St. Ybes	" "	84.2	"	

QUANTITY OF SALT USED.

In regard to the amount of salt which has to be used in salting codfish, this depends much upon what sort of salt is used, the size of the fish and the length of time in which the fish is going to remain in salt. Large and fat fish require more salt than small and lean fish. Fish that is going to remain any length of time in salt should be given more coarse and less dissolvable salt than fish which is intended to be cured soon after it has taken the sufficient amount of

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salt. Although most sorts of salt contain nearly the same degree of saltiness, the influence of the kind of salt used on the amount has to be taken into consideration, because there is a considerable difference in the weight. For instance, while a barrel of fine Liverpool salt, loosely measured, weighs 218.3 lbs., one barrel of coarse-grained Lisbon salt weighs 288.8 lbs. Shaken well together, the weight respectively is 298.8 and 357.1 lbs. One barrel of loosely packed Lisbon salt contains therefore 61 lbs. more chloride of sodium than the same measure of Liverpool salt.* For this reason the former must be used more sparingly than the latter kind, if measure is employed as an unit in the consumption of salt.

Cand. Wallen in his report upon the fishery exhibition at Berlin, has calculated that the proportion between the sorts of salt referred to, is as follows:—

					[of sodium (common salt).]	
One barrel	Liverpool salt	contains	91.8	kg.—	102.3	lbs. of chloride
"	"	St. Ybes	"	"	108.7	"—239.4
"	"	Trapanie	"	"	113.0	"—249.1
"	"	Cadiz	"	"	113.0	"—249.1
"	"	Lisbon	"	"	119.5	"—263.4

According to this one barrel of Liverpool salt weighing 100 kg., equal to 220.5 lbs. English, should be equal to 0.85 barrels of St. Ybes salt, 0.81 barrel of Cadiz or Trapani salt, and 0.77 barrels of Lisbon salt.

RULES FOR SALTING.

To give any certain rule for the exact and proper quantity of salt to be used in salting of codfish is as before stated difficult, because the weight of the fish even when cured ready for export is no constant quantity, as its weight, when made, will depend upon the circumstances under which the cure has taken place. The only correct way of determining the certain quantity of salt to be used would be to weigh the fish, after it had been split, washed and ready to be put in salt, along with the salt; but even if exact rules for the proper weight of salt employed to a certain quantity of fish was obtained in this manner, such rules would hardly ever be carried out practically to any extent in countries where the fish is disposed of when ready made or cured.

SALTING AT LOFODEN.

In Lofoden (Norway) they generally reckon a certain quantity (5 barrels) of salt to every 1000 fish in number, but this is not a ra-

* These investigations has been carried out by the society for the promotion of the fisheries in Norway, and the barrels here referred to contain 27.74 gallons.

tional way of calculation, because the fish on an average, although not to a great extent, always vary somewhat in size, also the salt in weight. As the difference in the saltiness of the various sorts of salt proportionately is not very great, the same weight, in practice, may be considered to contain about an equal quantity of chloride of sodium; and as the people here are used to judge the weight of cured fish, and by practice come pretty near the mark, the most rational way would be to reckon a certain weight of salt to a certain weight of dry cured fish. The most hygroscopic ingredients of which the salt consists are sulphate of calcium (gypsum) sulphate of magnesium (epsom salt) and chloride of magnesium.

DIFFERENT NATIONAL METHODS OF SALTING.

The amount of salt used by the different nations in the kench-cure of codfish varies considerably. Thus while the Icelanders are using in all a little more than 7 barrels of Liverpool salt to one ton of fish, the Scotch use $4\frac{1}{2}$ to 5 barrels of Liverpool salt to one ton of dry fish. This is due to the fact that they mostly pickle their fish. The Canadians use $4\frac{1}{2}$ barrels of Cadiz salt to one ton of fish, and the Americans reckon they use one bushel of Trapani salt to one quintal of fish on short trips; on long trips to Grand Bank, $1\frac{1}{2}$ bushel to one cwt. Several experiments have been carried out by the Society for the Promotion of Fisheries in Norway, in order to find out the proper amount of salt which should be used in the kench-cure of codfish; and the result they have come to in this way is that * $6\frac{1}{2}$ brls. of Liverpool salt, or * $5\frac{1}{4}$ brls. of Cadiz salt, are the proper amount which should be used to 1000 kilograms (2205 pounds English) of dry fish. If weight is employed respectively 1435 and 1462 pounds of salt to 2205 pounds of fish,—*English weight*. The Cadiz salt is less saline than Liverpool salt, for that reason more of the former must be used in weight although the difference only as shown above is 27 pounds on 1435. But on the contrary, because it is heavier than Liverpool salt, less should be used when measure is employed, because the difference is considerably larger, namely, 1.2 brls. on 6.5 brls. If too much salted, fish gets dry and hard in the salt, and when cured it gets soft. This is the reason why the Labrador fish never gets properly dry,—according to the statements of other nations.

NORWEGIAN SOCIETY'S RULES.

The following are the rules the Norwegian Fishery Society sets forth in regard to cure of codfish:—

* 29.7 gallons per barrel.

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1. All fish should be handled with care as well of the fishermen as of the curers.

2. The dressing of the fish should take place as soon as it is landed.

3. All fish should be bled as soon as it is taken out of the water.

4. All fish should be washed well in fresh and clean sea-water, and the water to be allowed to run well from the fish before it is salted.

5. Frozen fish should not be split or salted before it is properly thawed.

6. In splitting the fish the back-bone should be cut off three joints below the anus, in such manner that the spinal cords remain in the fish. The bone can be torn out or cut out with the knife.

7. For every day the fish has been left over on the fishing gear, a reduction in price should be made and proportionally larger, the longer time the fish has been left on the gear. For bled fish a higher price should be paid.

8. All fish handled exceedingly well, and fish which is reckoned to give a first-class article should be salted separately by itself.

9. All salt should be even and of equal size.

10. Coarser and less easily dissolvable salt should be used to such fish that is intended to remain in salt a long time.

11. The amount of salt used for curing of fish should be calculated in this way that a certain weight of salt correspond with a certain weight of dry cured fish.

12. In salting the fish in kenches, it should be stretched well, and the salt distributed in even quantities over the fish, according to its thickness and size. The brine should be allowed to run off.

13. If the fish be salted in the open air (which often is the case in Lofoten) the kenches must be well covered with canvas or tarpaulines and a foundation made underneath the kenches, in order to prevent ground water from gathering underneath the fish.

14. For 1000 kilogram (2205 pounds English) dry cured fish should be used 750 kgr. (1435 pounds English) of salt.

THE WASHING OUT OF THE FISH.

The washing of the fish before being spread out to dry should take place in clean sea-water and not in dirty water or in pools. If the fish is not washed in clean water, it loses its fresh, bluish color; and if washed in pools it will turn a dark gray color and also get a

disagreeable smell. If the fish has been washed before it was salted, this second washing will come very much easier. Attention should be paid to this—that all the blood and slime is removed carefully, and that the fish be cleansed well about the folds in the back, around the dorsal fins, the nape bones, and the blood bone, if this is not cut out, which it ought to be. In washing the fish, brushes or wollen mitens can be used. In some countries a gravel or stone beach is preferred to anything else in washing out the fish. The advantage of using a beach for that purpose is, that always more pure and clean water can be had, and that there is no labor in pumping up and renewing the water. An ordinary able washer ought to be able to wash out sixty fish properly in one hour. When the fish is washed, it should be laid in small sloping heaps (not more than 6 or 8 fish in each) in order to prevent the undermost from being too much pressed, the tails sloping downwards to give the water a chance to run off. The undermost fish should be turned with the skin side down; the others face down. The fish ought to remain in these heaps at least 24 hours, or if the weather, after that time, does not allow the fish to be spread, it must be left in the heaps until this can be done. The place where the fish is put out should be clean. Old fish must be handled with more care than fish which has been salted down fresh. Where there is considerable difference in the size of the fish, it is recommendable, in regard to the piling and pressing of the fish, that it be sorted, so that the large and small fish can be made separately. If the fish is salted too much, it should remain in the water for one hour or more according to the judgment of the curer, because if the superfluous salt afterward must be drawn out by pressing, it will take a longer time to make the fish.

THE DRYING PLACE.

In many countries flakes are in use because few places are to be found naturally suitable for making fish. Flakes are perhaps more expensive in countries where the wood is scarce, but are no doubt the best. The advantage of flakes in preference to rocks or beaches, is

1. That the fish gets a better draught of air underneath, which again causes the evaporation of the water a fish contains to take place quicker. On account of this, less pressing is also needed in countries where the air is moist.
2. The fish is easier to keep from getting sun-burnt on flakes than on rocks beaches.
3. Ground-water has no chance to get to the fish.
4. The fish can be kept better clear from dust and impurities.

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5. Fish dried on flakes gives better weight because it keeps the salt better than fish cured on rocks or beaches. The latter fish require more pressing.

6. Fish are also cured quicker on flakes. Of flakes there are several kinds; but the best and most practical is no doubt the American.

If the fish gets slimy while in stock, which generally is the result of the fish not being properly dry, the moist and slime should be rubbed off, and the fish put out to dry in the air a day or two.

If the weather has been hot during the day, the fish, when gathered together for the night, should never be put in piles before it has got cold. If put in piles while warm, it is liable to get sun-burnt. In case the weather has been squally, and the fish had to be taken in while it was warm, it should be piled or turned over again the next day, if the weather does not admit the fish to be spread.

If the weather becomes calm and the sun hot, fish should not be spread except it is found absolutely necessary, especially on beaches or rocks, because these very soon get heated by the sun; and the fish, in such weather, very soon gets sun-burnt if not carefully attended to. In the States, the fish, in such weather, is covered with cotton-cloth (awnings) spread over the flakes; in some other countries they cover the fish with boughs of spruce or fir. If any of those cannot be had, the fish can be piled in small heaps (about a dozen in each), in such a manner that the fish is showing as small a surface as possible towards the sun. When the fish, after being pressed a little, is sufficiently dry and stiff enough to bear its own weight without bending, it may be put slantways on its edge, in order to prevent the fish from showing the broadside to the sun, and small heaps formed in that manner.

The fish should not be too dry before it is put in the first pile, in order to give it a better chance to sweat, or project its salt. In the beginning, the juice the fish contain has an acid and sharp taste, and is not clear, but later on, this juice gets a mild taste and becomes clear like water. The fish is then in good condition. Should the juice again become turbid, the fish ought to be put in smaller piles, in order not to press it any more.

When the fish is put in piles care should be taken that the bilge or napes of the one fish are placed in the middle of the back of the other. The piles should be made either perpendicular outside from the bottom to the top, or a little wider at the top than at the bottom, in order to keep the rain better from the fish in the lower part of the pile.

The piles should always be covered against sun and rain; if the cure has taken place on rocks, the piles should be placed on a little elevated place, in order to prevent ground water from affecting the fish. A foundation of small stones is the best; boards also can be used. The undermost layer of fish of course is to be placed face up, the rest face down. When the fish is re-laid in other piles, the necks which showed outward in the first pile should be placed inward in the second. If the fish should seem to be too dry, when re-laid in the pile, it can be moistened a little with fresh water, in order to give it a better chance to work in the pile.

In a country where the climate is damp, a weight should be applied on top of the piles, from the first time the fish are placed in piles, and this weight should be increased according as the curing of the fish progresses, and the weights should be distributed even, all over the top of the pile.

It is recommended by many to dry the fish in the sun, back up, in case it is too much salted, or if it is salt-burnt. In this way it is claimed that the salt is drawn from the face of the fish. The fish should be turned more frequently, the more the making or curing progresses.

FISH IN STORE.

The cured fish in the piles can be taken out according as it is properly cured, and loaded into vessels for shipment, after getting a little sun, or it may be stored; but care should be taken that no fish be put in a store-house in stock, or loaded into vessels for shipment, if it is heated by the sun. In damp weather, fish in stock in the store-houses ought to be well covered; whereas a good draught of air is recommendable to let circulate through the store-rooms, when the weather is dry and the store-houses are clean and not infected with mites (*walleimia ichthyophaga*) which cause the fish to turn dun. If the fish is kept long in stock, it should be piled over again into new piles at least every second or third month, in order to give the fish some airing and also for the purpose of examination. The bad fish ought to be removed and, if possible, improved, before it is put back into the piles again; if this is not done, this bad fish often will infect the good ones. Straw of oats is held to draw out the superfluous salt, give the fish a good color, and prevent it from turning slimy.

DUN FISH.

The above-mentioned mite (*walleimia ichthyophaga*) which causes the fish to turn brown, or covered with brown or black colored spots, are, when they first get on the fish, very small, and look like

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brownish dots. After a time, these grow larger and spread themselves all over the face, and on a later stage, also over the skin-side of the fish. These dun fish cause a lot of trouble in foreign markets, are difficult to sell, and if abundant, also threaten to destroy a whole market. In Norway they are much troubled with dun fish, and the most of the people have, until some years ago, always taken these brown spots to be mites. Investigations as to what these spots really are, the cause of the fish being affected by them, and how to prevent the fish from being affected or dun, was, as far as I am aware, first carried out by the society for the promotion of the fisheries in Norway; but for many years at a large expense and without success, even in finding the right nature of these spots. At length, in 1880, Cand. Wallun, who had been working on this subject for years, discovered that these brown spots were not *animals* of any kind, but a *plant*, like a mushroom, belonging to the vegetable kingdom. After many scientific investigations, carried out by botanists in Norway, Denmark and Germany, and after all the botanic literature that could be found in all the universities in these countries was gone through, it was known for certain that these brown spots and dots really were mushrooms; but to what genus they belong was not known till 1886. When it was found that this was an entirely new genus of mushrooms, which never before had been described by anyone. Investigations have been carried on ever since, as to how this plant mainly gets on to the fish, and it has been found that the most of the store-houses and vessels carrying fish, are regular seats for them. Practical and cheap means to destroy this plant entirely, without hurting the fish, have not yet been found; but this difficulty will, no doubt, within a few years, be overcome, when the nature of this plant that turns the fish dun is known.

THE METHOD OF CURING FISH IN DIFFERENT COUNTRIES.

It must be understood that in giving a description of the methods of cure of codfish in different countries, of course only the main principles in the cure can be referred to, on account of the cure being all over dependent on the climatic conditions, and the state the fish are in. To enter into the details would, therefore, be, in one way, almost impossible, and on the other hand, misleading.

NEWFOUNDLAND FLAKES.

In Newfoundland the mode of covering the flakes with boughs is very much used, and I have met with many who do not think their flakes are kept in good order, unless they are covered with new cut boughs every spring. I cannot approve of this idea; because these

boughs, especially when they are green and spread on the flakes prove to be regular nests for flies and many other kinds of insects, which injure the fish, and therefore should be kept away as much as possible. My opinion is that the flakes in Newfoundland would be much more suitable for curing fish on if the boughs were done away with altogether and the rind also removed from the flake-longers, leaving only the clean wood. If then the longers were fastened about one inch apart, or one inch and a half, there would be a better draught of air underneath the fish, and the flakes on account of being cleaner and more open would not give flies or insects much of a chance to reside there.

NORWEGIAN METHOD OF DRYING.

In Norway, where a large part of the northern and western coast consists of naked mountains, there are numerous smooth and low rocks close to the sea suitable for making fish on. But to cure or make fish on such rocks is much more difficult than to make fish on flakes, because the rocks in hot weather very soon get heated by the sun, and if the most careful attention is not paid to the fish, under such circumstances, it will soon get sunburnt even in the course of a few minutes. It also takes a longer time to make fish on those rocks than on flakes, because the draught has very little chance to act upon the fish underneath, and for this reason it takes a longer time before the water which the fish contains evaporates. Beaches are also preferable to smooth rocks, because the draught has a better opportunity to penetrate underneath the fish. Where beaches for making fish have to be made, grass, moss or turf should be removed before the rocks are put down. To put gravel underneath the rocks is recommendable, in order to prevent the dust from settling on the fish. If dust gets on to the fish while it is soft it is nearly impossible afterwards to get it removed. A drying place for fish should be selected where there is no wood in the neighborhood, in order to prevent flies and insects, as much as possible, from getting to the fish. A naked or bare place, shaded as much as possible from the hot sun, but open for dry winds where there is plenty of draught, where the ground consists of rocks or gravel, and at the same time convenient to the beach or landing-place, is preferable, for the purpose of curing fish.

In Norway, where the fish are cured mostly on rocks, these drying places are generally selected so that they are turned from the sun or slope towards one of the points between north and east. In this way they lie open to those winds, but to leeward of southerly and westerly winds, which are the moistest there. Rocks which are sloping are the best, because the reflection of the sun-rays does not

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gather or play on single spots. Fish placed on horizontal lying rocks are very liable to get sunburnt.

THE DRYING OR MAKING OF FISH.

The making of fish is carried out somewhat differently in the various countries, according to the condition of the climate and the markets to which it is to be exported. In one respect, however, there is a similarity—namely, that the cure of fish everywhere is dependent on atmospheric conditions; and as the consequences of those conditions are the same everywhere, of course all nations have the same difficulties to battle with, more or less. For this reason, the making of the fish must be carried out according to the condition of the fish itself and of the weather, and no certain or constant rules can be given for the curing of the fish in any country; but what can be done is, to set forth rules gained by experience, and practical as well as scientific knowledge. These rules will show how to work under certain circumstances, in order to obtain a good article, or how to obviate mischiefs or difficulties that might occur in the making of fish.

It is the duty of every honest fish-curer, according to his best knowledge, to counteract, as much as possible, all the detriments to which the fish are exposed, and by a careful treatment, throughout the whole process of the cure, do his best to obtain a good article. A great many misfortunes or accidents, as many are pleased to call them, can, by carefulness, be *prevented*; but very few can be remedied after the mischief has taken place. Difficulties as to the fish getting slimy, mity (dunn), salt-burnt, sun-burnt, troubled with flies, etc., occur as well on the other side of the Atlantic Ocean as on this side; and the means by which those can be prevented are the same everywhere, no matter whether the fish is cured on flakes, rocks or beaches. It may be pronounced in one single word, namely: Carefulness.

HOW TO MAKE GOOD FISH.

Good fish can be made even if the weather should not be in all respects favorable, if the proper attention is paid to the fish, good weather days taken advantage of, and no labor spared; but, of course, such unfavorable weather may also be met with, during the whole cure, that it is impossible even with one's best efforts to get fish well made. To make fish in bad weather and under unfortunate circumstances requires great skill, and much labor. Often, for instance, the weather may continue bad for one or more weeks. Other times again, when the weather is favorable, the fish must be left in piles to sweat. Sometimes one favorable day for drying fish may be had; at other

times, again perhaps only a few hours. The making of fish therefore must be carried out according to the condition of the weather. If this is favorable in the beginning of the cure, the fish ought not to be spread out for drying daily; but should be left standing over in small heaps for a day or two, in order not to dry too quick. If the fish is dried too quickly, it is liable to get frangible, and also lose its good appearance. If the weather is unfavorable during the cure, the fish should, after having had one or two days' sun, be piled over into new piles, at least every second day; or as often as there is a chance, as long as the bad weather continues; and the piles should be made small, in order to give the fish more draught. It is poor economy to save labor expenses in such cases, providing the weather allow repiling of the fish.

PILING FISH.

The fish by being piled over and over again several times get a white colour, better appearance, and are not so liable to turn slimy. A little rain on the fish in the beginning of the cure is not considered hurtful; but towards the end of the cure, this should be avoided as much as possible, because the rain will then give the fish a yellow color. If the fish still should get slimy, it can be improved by dipping or washing it in pickle (brine) or by putting a little dry salt between each layer of fish.

THE CURE OF FISH IN NORWAY.

I have formerly stated that the Norwegians reckon the proper quantity of salt to be used in the cure of codfish—1,435 pounds of salt to 2,205 pounds of dry cured fish.

As a rule the most of the fish caught at Lofoten are left in salt from three weeks to two months, all according to how the fishery turns out, and how quick the vessels purchasing fish can succeed in getting a full cargo. After the fish are taken from the salt they are generally washed out at the beaches, close to the drying places, which, as a rule, consist of smooth and low rock, in the vicinity of the seaboard. In washing the fish woollen mittens are worn on the hands. After being carefully washed and the black membrane removed from the napes of the fish, it is put in small sloping heaps on the rocks for twenty-four hours, in order to allow the water to run off. In each heap are put from six to eight fish. The undermost with the skin-side turned down, the rest with the skin-side up. As soon as the weather allows the fish to be spread, after being in the heaps 24 hours, it is carried up to the drying place and spread out face up. If the weather is fair and safe the fish is left out the first night, but the skin-side is in that case turned up towards evening. Next morning the fish is again

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turned face up. After being left out the second day it is gathered together towards evening and put in heaps, 30 to 50 fish in each. The next morning it is spread again and in the evening put in a little larger heaps. When the fish has been spread two or three times it is stretched well, especially in the abdomen, before being put in heaps, in order to remove all the wrinkles and give the fish a smooth appearance. This work is considered to be of much importance in regard not only to appearance but also to the durability of the fish, because the dampness always gathers in those wrinkles and is very difficult to get removed entirely if not done away with in time. It is slow work, but they consider it better to devote one day to this than to go through it in a hurry in the evening when the fish are gathered in heaps for the night. Every time the fish are gathered in the evening in heaps these are made larger. After the fish has been spread three or four times, or when it is dry enough to stand pressing (which is noticed on the abdomen of the fish that crack when the fish is bent) it is put into the first pile for pressing. These piles are built round, and a small round peaked roof or cover of wood, about a foot larger in diameter than the pile of fish, is made to cover the piles with. On these roofs weights of stones are applied. These piles or pressing piles, as they generally are named, are built from 3 to 3½ feet high, the first time. After the fish has remained in those piles from five to 8 days, according as the fish was more or less dry, when it was put in piles, it is piled over into another and larger pile in this way, that the undermost fish in this first pile is placed uppermost in the second, in which again the fish is left the same length of time as in the first one. If the weather, after that time, is suitable, the fish in these piles is spread every second day to dry; and for every time it is spread it is set in larger piles. If the weather is not suitable for spreading the fish, it is as often as possible piled over into new piles, in order to accelerate the cure and prevent the fish from afterwards turning slimy.

The fish is not reckoned to be properly dry until it keeps itself dry underneath the dorsal fin (fins on the back of the fish), or is capable of withstanding the pressure of the thumb without leaving marks in the thick of the flesh. After the fish has been put in pressing piles, and afterwards been spread out for drying, four to five times, the fish will, under fair circumstances, be reckoned to be properly cured. The usual time, under favorable conditions, taken to cure or make fish in Norway is about six weeks. These are the main characteristics in the Norwegian cure of fish: nearer I cannot go, as the work during the cure must be regulated according to the condition of the weather.

CATCHING AND CURING BY DIFFERENT HANDS.

No fishermen make their own fish at the large fisheries at Lofoten or Fimarken, except a few who make their fish into stockfish. It is disposed of, fresh, as soon as it is brought in from the sea or fishing grounds in this way, that the fish, after being headed and gutted, are sold to vessels, which the fish-merchants send up to the fishing-places to purchase fish from the fishermen and salt it down in the vessels. These vessels are manned with captain, cook, one or two salters and two splitters. The fishermen are paid cash down for their fish as soon as it is delivered, or if the purchaser and seller are well acquainted, he may let the account stand unsettled until the week is up and settle every week, or perhaps every month, but this is seldom done. The captains, as a rule, get sufficient money in cash with them to purchase a full load of fish; or if they have their stations in convenient places, get money sent them according as they require it. The liver the fishermen sell themselves, separately, to oil factories, of which there are many in each large fishing place. The roe they sell separately, to parties who make it a business to salt it down and turn it into caviare, or export it to France, to be used in the sardine fisheries. The heads are dried and sold to the guano factories. In this way the fishermen generally turn the liver, roe and heads into from 30 to 50 per cent. of the value of the fish itself. When the vessels have got their full cargo of fish, they take it down to the drying places and either hire men, women and boys to assist them in curing their fish, or make a contract with a fish curer (of which there are several), at a certain figure, to cure their fish; the captain, in this case, generally going up to purchase another cargo, after getting his fish landed. The general price paid for washing-out and making fish in Norway doll. 5.40 per 1,000 fish in number, which is equal to about one ton of dry fish. Most of the larger merchants have their own fish-curers in different places, who are paid a fixed salary annually, or paid per 1,000 fish for curing all the fish belonging to the merchant, and keeping the drying place in good order.

ADVANTAGES OF THIS DIVISION OF LABOUR.

These men are specialists in curing fish, and do nothing else all their lifetime; they make fish-curing their trade. Besides, as it is of no interest to them to get bad fish (not properly cured or heavy fish), as they are paid a fixed salary, or per 1,000 fish in number, they, as a rule, always do their best to get as good an article as possible. In fact, as there is no selfish interest playing among them of any kind, in regard to money-making, on account of a careless or imperfect cure, the merchants can get their fish cured in the best way, according to

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their own order, and to suit the different markets; and the fish-curers, on the other hand, are generally only too glad to do their best, in order to keep the position they hold. At the same time this system proves to be of great advantage to the merchants themselves, in this way: that they seldom get any badly-cured fish from their own curers, and run no risk of losing any money by supplying the fishermen. It is also of the greatest importance in view of the fishermen themselves, because by selling their fish fresh they have no labor in making it, have no expenses in salt, and waste no time; therefore they can devote all their time to fishing and in keeping their boats and gear in good order, which pay them very much better than wasting time inshore by dressing and making fish. While doing so, they might, in a good season lose boat-loads of fish; and the fishery must be very poor if, in most cases it does not pay them better to be on the fishing-ground than to be inshore working with their fish. Besides, it often happens that a fisherman has not sufficient salt to cure his fish, and no means of getting any. In such cases his fish gets spoiled or badly treated, and will only give a poor article or refuse. This bad fish again helps to run down the reputation of that country's fish from which it is shipped, and will even sometimes drive down the price of real good fish from the same country.

DISADVANTAGES OF EMPLOYING WOMEN IN CURING.

In some countries the fisherman's wife and small children have the most to do with the making of the fish. This is just as bad, or even worse, because, in the first place, not one out of every ten women understand properly how to make fish; and on the other hand, even if they did, they have their house, with a large family, as a rule, to attend to, and cannot be expected to be able to devote the necessary time required for making fish *as it should be made*, but must go through it in a hurry, in order to attend to their house, family and garden at the same time.

SEPARATION OF FISHERMEN AND CURERS BEST.

Let the fishermen then devote all his time to the fishery and tending to his fishing gear; sell his fish fresh; and have nothing to do with the making of his fish caught, and *that will pay him better*. Let his wife mind her own business (her house, children and garden) and devote the little time she has to spare to her husband's and children's comforts, *that will pay her better*. Let the fish-curer, who thoroughly understands the cure or make of fish, have all to do with this part of the work, then the large bulk of fish would be cured properly, the reputation of the fish exported to the foreign markets to be kept up, and that would pay the *Merchants better*.

THE CURE OF FISH IN SCOTLAND.

In Scotland nearly all the fish is pickled, very little of it is kench-cured fish. As soon as the fish is caught and unhooked it is bled and gutted. Some fishermen bring with them boxes to keep the fish in; but if boxes are not used the fish is covered up in order to prevent the sun and air from affecting it. When brought to the shore it is headed and cleansed with brushes in fresh water, and split. The back-bone is cut slantways, 20 to 22 joints from the tail, so that the cut extends over two joints, in order to give the fish a better look and strengthen it. A cut is made along the bone which is left, thus allowing the blood that remains in the veins, about that part of the fish, to escape or be extracted. When split the fish is again washed in sea-water and the black membrane removed. After the fish is cleansed it is pickle-salted in tight and covered vessels. To one hundred pounds of dry-cured fish is used 45 to 50 pounds of Liverpool salt. If less salt is used the fish is left in the pickle (brine) a couple of days more.

In regard to the amount of salt used, the Board of Fisheries remark that many of the curers salt their fish very heavily in order to increase the weight; but this is a great mistake, because not only is the juice of the fish extracted thereby and the weight reduced, but also as the drying advances, incrustation of salt forms on the face of the fish, or, in other words, the fish gets salt-burned, and this debases the value of the fish very much. Lately, however, this wrong method of salting fish too heavily is abandoned in Scotland, because the curers find it to be in their own interest not to use too much. The fish is as a rule left in the salt for three days. The salting of the fish is a difficult work when the climate is damp. If the fish, under such circumstances gets too little salt it will soon become dun. Whether the fish has taken sufficient salt or not, and whether it has got the required stiffness before being taken from the brine, the curer must be able to judge himself. Quite fresh fish never take more than just the proper amount of salt they claim, no matter how much salt is put on it; whereas old fish very soon gets salt-burnt, if too much salt is used.

When the fish has taken a sufficient quantity of salt, it is taken up and washed out again in sea-water, and placed in piles that slope a little, for a day or two, in order to give the water a chance to run off before the drying commences. The fish, as a rule, is dried on flakes three feet high and four feet wide, the top of which is formed of wooden laths six inches apart, something like the American flakes. On these flakes the fish is put out the first time, with the back or skin

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side turned down. Towards evening it is turned over, skin side up; and before sunset it is gathered in small heaps, always bearing in mind to leave the back sides of the fish turned up. The fish is turned more frequently as the drying advances; the heaps are also made larger every time the fish is spread, and weights are put on top of each heap, in order to give the fish a little pressing and a smooth face. The heaps are always covered with mats or canvas. The Scottish curers are also of the opinion that the fish gets frangible or brittle, and presents a bad appearance if it is dried too rapidly in the beginning of the cure. When the fish is half dry, one is able to tell whether the fish is salt-burnt or not. If the fish is salt-burnt, they turn it back up in the middle of the day, when the sun has most power, by means of which the salt gets extracted from the face of the fish. Mr. Ross, Inspector of fisheries, recommends always to dry the fish with the skin-side turned up from the time it is half dry. After the fish has been dried a fortnight, it is put in large piles for ten days, in order to allow the fish to sweat. The piles are covered well. After being taken from these piles it is spread out to dry for one week; after which it is again put in large piles for another four to six days. When after this it gets two or three days' drying, it is considered to be properly cured and ready for shipment. The average time for making fish is reckoned to be from six to eight weeks.

METHOD OF STORING.

The storing of fish is done either in the morning or in the evening, never when the fish is warm from the sun. The fish is kept well covered during the time it is in stock in order to keep the air out as much as possible. The fish that is caught in winter but cannot be made before spring is also salted the same way in large vessels, but is taken up and washed out after being left in the pickle the usual time and re-salted in kenchies, with a little salt between each layer, and generally covered up with canvas. Re-salting of the fish is also used on board the vessels. The fish is first salted in certain bins in the vessels hold, with one ton of Liverpool salt to two tons of green fish; and after being in this salt for about 36 to 48 hours, it is taken up; the old salt is shaken off and the fish is re-salted with a little new salt in another bin. The Board of Fisheries in Scotland also hold that flakes are preferable to rocks or beaches to make fish on, because on flakes the fish gets a more even draught of air on both sides, and is better prevented from being sunburnt.

THE CURE OF CODFISH IN ICELAND.

The codfishery in Iceland is by the natives carried out in small, open boats, in the bays and in some places a short distance from the

shore. The gear employed is hand-line and bultows. As soon as the fish is caught it is bled; brought in shore, it is split in this way, that the remainder of the back-bone is left on the opposite side, to what is usual in Newfoundland and many other countries. The Icelanders split their fish very deep. After being split the fish is washed with brushes in clean sea-water; the black skin and all blood being carefully removed. A few also use to wash their fish in fresh water. The back-bone is cut slantways, over two joints, and 18 to 22 joints from the tail, according to the size of the fish. The salting of the fish takes place in sheds as soon as the water has run off it and it is salted in kenches with one barrel of Liverpool salt to about 350 lbs. of large dry fish; if the fish is small less salt is used. After the fish has remained two or three days in this salt it is resalted in new kenches; very little salt (about $\frac{1}{8}$ of a barrel of salt to 350 pounds of fish) is used. In this salt it remains for five or six days and is then ready to be washed out and made, if the weather and the season of the year are suitable. The fish that is caught so late in the fall that it cannot be made before the next year is salted in kenches so heavily that that one fish does not touch the other; this fish, they claim, will then in the spring be of about the same quality as if it was caught the same year: provided it is washed or cleaned properly and all blood carefully removed.

After the fish has remained a sufficient time in salt it is washed out and laid in small heaps, until the water has run off and a little stiffness is felt in the fish which generally is so the next day, and if the weather then is fair the fish is spread out to dry, if not it is relayed in square piles from 100 to 150 fish in each. If the weather should continue to be wet the fish is piled over in new piles every day, as long as the bad weather lasts or until it can be spread. When the fish has been spread and got two good days' sun, it is put in pressing piles and the pressing is increased according as the making of the fish proceeds. When the cure is so far advanced that the fish is what they call three-parts dry, it is put in large piles, about 7,000 pounds of fish in each; these piles are covered with mats or boards in shape of a roof, and a weight of stones, which correspond with the weight of the fish in the pile, is placed on top of the mats or boards. In this state the fish is allowed to remain five to six days, after which time it is spread again, if the weather permits, and the same weight applied every time it is gathered and put back into the piles. In case the weather does not allow the fish to be spread, after it has been put in the first large pressing pile, it is re-piled every day and the same weight applied to each pile every time until it is considered cured.

The fish is cured on leaches, which in most places are made of

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round rocks. The reasons why the Icelanders use such a heavy pressing in their cure of fish are: 1, That the climate is damp and not very warm (as a rule the sun is seldom hot enough to burn the fish, although this may happen occasionally) and that the weather is mostly cloudy or foggy. 2, That their fish is heavily salted. 3, That their fish is rich and thick, and stands a good deal of pressing. On account of the climate being chilly and damp, the pressing is therefore the principal part in their cure, and by frequently pressing and re-piling the fish, the cure is also accelerated. The Iceland fish is a fine, white-looking, good-eating and durable article, which commands good prices in the markets of the Mediterranean. Although it always is a little pliable, or not cured as hard as the Newfoundland and Norway fish, still it keeps well in hot climates, and is preferred to the hard-cured fish, because it is not so apt to get brittle and break. Fish cured in the early spring, or in the fall of the year, when the climate is chilly, are, if sufficiently pressed and salted, superior to the hard cured fish in summer time, even if it is a little pliable, and will keep well in hot climates. Complaints of the hard cured fish being brittle and difficult to handle, are often made in the Mediterranean markets.

When the fish is stored in Iceland, it is kept well covered with mats or canvas, in order to prevent the moist air from affecting the fish. The principal market for Iceland fish is the southern part of Spain, while a part is also exported to Copenhagen and Great Britain.

THE CURE OF FISH IN FRANCE.

The fish brought to France is mostly all bank-fish, caught on the Banks of Newfoundland and on the coast of Ireland. With the exception of the fish cured in St. Pierre and Miquelon, all this fish is cured in France, and the greatest part of it in Bordeaux. To this port it is brought salted in bulk, in compartments in the vessels' hold, and cured according as the orders arrive for certain quantities of fish. By being handy to the markets, with excellent communications and their modern way of doing business, in connection with the great bounty the French government give on all fish exported to other countries, this industry has developed to such a degree that it has lowered the price on the fish of all other nations, and threatens to knock other fish out of the markets, because it can be sold cheaper. Besides, it is cured in such a manner that in fact it is a real good article for speedy consumption, and takes among the people in the different markets.

Their way of business is to keep commercial travellers on the move all the time through all fish-consuming ports, and orders, as well

small as large, are speedily and accurately executed for the various customers in the Mediterranean markets. The more the French can enlarge their fishing fleet, and the more fish they can catch, the more difficult it will be for other nations to compete with them, and the smaller the chance will be to make the fishing business pay, as the French, with their large bounty, can undersell all other nations, in the markets, and still make their business pay.

FRENCH SPLITTING AND CURING.

In splitting the fish the French cut the back-bone a little further from the tail than most nations do, and for this reason an iron spoon made for the purpose is used for removing the blood in the remaining part of the back-bone. The fish is always washed well before it is put in salt. They generally reckon on using one hundred tons of salt (Mediterranean) to two thousand cwt. of fish, including the salt which is used for preserving their bait. While all other nations either use rock, beaches or different kinds of flakes to cure their fish on; the Frenchmen in Bordeaux use scaffolds on which the fish is hung by the tail. This is held to be the most practical in France, because in this way the fish is cured exceedingly quick (from two six days) with a minimum of labour expenses and gives a real good article, although as before mentioned not so durable. These scaffolds are made in the following way: A number of sticks are driven down perpendicular in the ground about $1\frac{1}{2}$ yard apart in a straight line from west towards east, across which are fastened a row of two laths, far enough apart to admit the tail of the fish to be pushed through. About $\frac{7}{8}$ of a yard above this first row of laths another row is fixed in the same manner. These laths are from $\frac{3}{8}$ to $\frac{5}{8}$ of an inch thick and from $1\frac{1}{2}$ to 2 inches wide. The arrangements of these scaffolds vary a little; some are fixed in square compartments with laths fastened alternately on the north and south side of the posts, and with a gangway about two feet wide between each row of compartments. On others again, the laths are all fastened on the north side of the posts and each row of scaffolds about three yards apart, in order to prevent the shade from the row in front reaching the one behind. Small cleats of wood are fastened across each pair of laths, for the purpose of keeping them together. The tail of the fish is pushed in between the laths from the north side with the back of the fish turned upwards; by its own weight it will bend down, and the face of the fish show towards the sun, while the tail is jammed between the laths. When the fish is getting a little dry it will hang this way even in a strong breeze of wind. Some have a roof covered with straw over their scaffolds when the sun gets rather hot, others again use no covering, but when the sun threatens to burn their fish they only

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twist it a little, so that the edge of the fish shows towards the sun instead of the face. In heavy rain or when the sun is too hot, the fish have to be taken down and put in the stores. In France no pressing of the fish is used; it is as a rule taken down from the scaffolds and shipped to the markets after being hung there for from 2 to 6 days.

THE CURE OF FISH IN THE SHETLAND ISLES.

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The codfishery in this country is carried out mainly by the use of bultows. The Shetlanders split their fish in the same way as the Icelanders, with the back bone left on the opposite side of what is usual here. It is cut according to the size of the fish from 18 to 22 joints from the tail, and slantways over two joints. The fish, as a rule, is split deep which makes it look thin along the back. As soon as the fish is split, it is washed with brushes in sea-water pumped up into boxes into which are placed a grate, six to eight inches from the bottom. Underneath this grate the dirt and offal gather, and the object of this grate is to keep the water cleaner a longer time in the box. Through a hole in the bottom of the box the water is drawn off. After the fish is washed carefully and the blood and slime removed, it is put aside for a while in boxes made of laths, one inch apart, in order to give the water a chance to run off the fish before it is salted.

They salt their fish in vessels with Liverpool salt, sometimes also with Lisbon or St. Ybes salt mixed. It is generally reckoned that one ton of salt is used to two tons of cured fish or four and a half tons of raw fish. When the fish has remained in salt for five to eight days, it is taken up and washed out in sea-water. What blood particles may have been left from the first washing is removed, and the fish well cleansed about the neck and about the back-fold; the black membranes are also removed. The fish is mostly cured on beaches, but a few flakes are also in use. These are about two feet high covered with laths on the same principle as the American flakes, 4 inches apart. After the fish is washed out, it is put in small heaps, to be spread the next day, if the weather is suitable; if not, the heaps are covered with mats until the spreading can take place. After the fish has got one good day's sun, it is put into square piles (about one-half a ton of fish in each) to be left in those for two, sometimes three days before it is spread again. After it has got two or three days of good sun it is put into larger piles (about three tons in each) and left to remain in those for a couple of days. According as the cure proceeds the piles are made larger, until about five tons of fish are put in each pile, and the fish are spread only every third and fourth day. No weight of stones is applied on the top of the piles. In setting the

fish in the piles, care is taken that alternately the undermost fish are put uppermost and the reverse. The piles are covered with mats. The curing of fish in Shetland takes from 5 to 7 weeks. If the sun is hot, the fish when spread is put edge-ways, two and two together, as in Norway. If the fish gets slimy, it is washed in strong pickle and is improved by re-piling and pressing.

When fish is stored it is always kept covered with mats or canvas. The principle markets for Shetland fish are Spain, Ireland and Scotland.

THE CURE OF FISH IF THE UNITED STATES OF AMERICA. (GLOUCESTER AND PROVINCETOWN.)

The codfishery in the United States is carried on along the New England shore, on the banks off the American coast, and the Banks of Newfoundland. The greater part of the fish are bank-fish, which mainly are brought into the fishing ports in the States of Massachusetts and Maine. In the smaller New England fishing ports, this fish are English cured, or hard dried, for the markets in the West Indies; while in the larger ports, nearly all the fish are put up into skinned and boneless fish. It is generally reckoned that only about $\frac{1}{4}$ of the whole amount of fish brought into the New England States are hard cured; while the other $\frac{3}{4}$ are put up for the local markets in skinned and boneless condition. Nearly all fish are caught with bultows and hand-lines; a smaller part are caught in gill-nets, and this chiefly in Ipswich Bay.

SPLITTING AND SALTING IN U. S.

After the fish is split in the same way as in Newfoundland, it is washed in sea-water before it is salted down in the bins of the vessels hold. Mostly Trapani salt is used of late years for salting cod-fish. Cadiz salt, which was much in use in former years, is done away with, on account of the reddish plant it contains, which often turned the fish a reddish colour. It is reckoned that one bushel of salt is used to one cwt. of fish on short trips to Georges bank; while on longer trips to the Grand Banks, $1\frac{1}{2}$ bushels of salt are used to one quintal of fish. As a rule, a schooner for a long trip to Grand Bank will take on board about 200 hogsheads of salt. After the fish are brought in shore, and weighed, they are rinsed in sea-water, and salted down in large butts, which hold about one thousand pounds of fish each, with from two to four bushels of salt sprinkled among the fish in each butt, all according to how much and how long the fish has been salted on board of the vessels. The fish are generally laid, with

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the exception of the lower or bottom layer, with the skin side up. On top of the uppermost layer of fish is put a heap of salt (about $\frac{1}{2}$ bushel) in order to strengthen the weak pickle that floats up to the surface. After the fish has been salted down in those butts for a day or two, it is supplied with pickle made in the following manner: A basket containing one bushel or one bushel and a half of salt is hung over the butt, sea-water is slowly allowed to run through the salt in the basket, which by the time it runs into the butt, has been strengthened with the salt and transformed into pickle strong enough to answer the purpose. As the salt melts away in the basket, it is renewed. Pickle made in this way is clearer than if salt and water are stirred together in a vessel, because much of the dirt the salt contains remains in the baskets. In these butts the fish remain a certain time, according as it has been in salt on board, and according to how the orders are received for certain shipments. Fish which have been sufficiently salted on board, and are intended for immediate shipment, are occasionally washed out well with brushes, as soon as landed, and put in kenches about three feet high for 24 hours before they are spread on the flakes. Sometimes also these kenches of fish are turned over, leaving the uppermost fish underneath for over 24 hours before it is spread on the flakes.

DRYING ON FLAKES IN THE UNITED STATES.

When orders are received for certain quantities of fish, which have been salted in butts, it is taken up, washed well and put in kenches, in the same way, for a couple of days before it is spread. In some places where the fish is intended to be hard cured, it is taken out of the vessels and salted in kenches in the stores and left in this way, often for a long time, or until orders run in for certain quantities. When the fish is to be cured, it is washed well with brushes, put back in kenches again for a few days, in order to press some of the water from it before it is spread out to dry. All fish are dried on flakes, of which generally two kinds are in use, stationary and moveable. The most common are the stationary ones. These are about $2\frac{1}{2}$ feet high, with a horizontal top made of triangular laths, $1\frac{1}{2}$ inch wide on each side, and fastened about two inches apart to wooden stands. On both ends, and along the flakes, are fastened galloways six feet apart, on which cotton awnings are spread, about 15 inches above the flakes, when the sun is hot. The width of the flakes is about 8 feet, and the length varies from 12 to 18 feet. The flakes are placed in rows, with a gangway between each, and are thus convenient to work fish on. The moveable ones are made on the same principle, but are generally not so long. They are fastened to the stand in the middle, and by taking away one of the stools at either end, can be turned slantways

towards or from the sun, according as may be wished. The fish are left out on the flakes until nearly dry. Every evening it is gathered together in small heaps on the flakes, skin-side up, and small covers of wood are put over each heap, in order to prevent dampness or rain injuring the fish. By a good draft, as well underneath as from above, the fish are cured in a short time. In good weather the fish is dry enough to put in the stores to sweat, after being out on the flakes from four to five days. In the sweathing piles it is left from two days and upward, to a week, after which time it is spread another day on the flakes, and then considered ready for shipment. No pressing or re-piling of the fish in large piles during the cure is used. The American fish are not cured as hard as the Newfoundland, have got a light yellowish color, and are heavy in weight. The fish exported are packed in boxes of $\frac{1}{2}$ inch lumber, dimensions, $27\frac{1}{2} \times 18 \times 10$ inches inside, containing about 50 pounds, or else in drums made of birch stave, with ends of pine, and eight hoops on each drum. In these the fish are packed the same way as in Newfoundland. For the local markets they are packed in bundles.

THE MANUFACTURE OF SKINNED AND BONELESS FISH IN THE U. S. OF AMERICA.

The principal places where this fish is manufactured are Gloucester, Boston, Provincetown and Portland, Maine. Since 1870 the trade in boneless fish has rapidly increased, and at present it is the principal way in which fish are cured and put up in the U. States. It is a nice and durable article, much adapted for family use throughout the whole country, and finds a ready sale also in other countries. Boneless fish is a little more expensive than other fish, but this as a rule is not much considered among the people in the States, when they can get a good and practical article. Even if they pay a little more per pound, they have not to pay for skin and bone, which is of no use to the consumers, but can be utilized better in the places where the fish is put up, and large quantities are handled. Besides in the way it is put up, it can be delivered in small packages from one pound to two pounds, ($\frac{1}{2}$ brick contains one pound) without trouble to the retailer, and more acceptable to the customers. It is a choice article of food, and on account of the fish being quite soft, it is also more quickly and easily freshened in water than hard cured fish, and is ready for use without further cleansing. Besides codfish, other sorts of fish are also manufactured as boneless fish, such as cusk, hake, haddock and pollack.

PICKLING OF BONELESS FISH.

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are Gloucester 70 the trade is the principal states. It is throughout countries. but this as a s, when they little more is of no use s where the in the way one pound to le to the re- ce article of more quick- is ready for ts of fish are haddock and when landed in the same

way as formerly described under the cure of fish in the United States, and left there until orders for certain quantities come in. The fish is considered to be best the first six to seven weeks while in pickle; after which time it loses in flavor. According as the orders come the fish are taken from the pickle and put in benches 3 to 4 feet high for one day. The next day they are repiled in such way that the uppermost fish come underneath. The object of benching the fish

is to press the most of the water from it by its own weight. I have also seen the fish taken from the pickle and put direct on the flakes for drying. The fish is dried only for one or two days; one fine summer day is considered sufficient. Subsequently the fish are brought up to the factories to be skinned, dressed and packed.

SKINNING AND BONEING.

This process takes place in the following manner:- With a knife much like a splitting knife, the dorsal, ventral, anal and pectoral fins are first cut away. When this is done, the skin at the nape is, by the help of the knife, lifted sufficiently to be got hold of with the fingers, and torn off in the direction of the tail, on both sides, along the middle of the fish. On each side, along the back-bone, is made a cut by a knife, and the bone is broken off by the tail and torn out from that joint towards the neck. The nape-bones and what skin may be left on the napes are torn off by means of a single or double hook made for that purpose, fixed in a handle. The fish is then turned over and the black membrane is removed. All flesh affected by blood is cut away; also the filaments about the neck and dark spots are removed. In some fish the back-bone is not taken out. Hake and haddock are reckoned to be the easiest fish to skin; then comes the cod; the worst is the cusk. The skin of the fish is manufactured into glue, and was sold to the factories at a price as high as \$25 per ton in 1887. The bones and fins, and other refuse, are sold to the guano factories for about 5 doll. per ton.

CUTTING AND PACKING.

After the fish is skinned and dressed, it is cut up in different ways, and packed in different sized boxes, from 500 pounds and down to 5 pound boxes. Some fish are not cut at all, but packed in their full size in boxes. Others are cut across, to suit the box they are packed in; others, again, are cut lengthways, in the middle in two parts, and packed this way. Again, some are cut in long strips. Thick fish are often cut in the middle, lengthways, and each piece cloven and folded up in such a manner that the clean cut fish appear

outside. Large quantities are put up into bricks. Between each layer of fish, when packed in the boxes, is sprinkled some preservation (a powder consisting of boracic acid and chloride of sodium). This prevents the fish from turning red, and helps to preserve it in good condition for a considerable long time. The boxes most in use are the 40 and 60 pound boxes. In the former, with dimensions 20 x 12 x 5 inches inside, the fish are packed either across the box or lengthways. In the first case, the fish are cut to suit the width of the box. In the latter, with dimensions 20 x 12 x 8 inches inside, the fish are always packed lengthways. The finest pieces are always laid on top in the boxes. These are generally so well filled that a machine, made for that purpose, must be used to press the cover down, while it is nailed fast. These boxes are made of $\frac{1}{2}$ -inch lumber and $\frac{3}{4}$ -inch in the ends. The 5-pound boxes are of dimensions 10 x 8 x 4 inches, with a sliding cover.

THE PACKING OF FISH IN BRICKS.

Bricks are small, square bundles of fish, weighing one and two pounds each, and made in the following way:—After the fish is skinned and dressed, it is cut up in square pieces, 6 inches long and $3\frac{1}{4}$ inches wide. This is done either by hand, or by tread knives, or by machine. The thick pieces are split in two. These cut up fish are put into strong wooden presses made for the purpose. These presses look like boxes, and are divided by $\frac{1}{2}$ -inch thick iron plates into four compartments, each compartment 6 x $3\frac{1}{4}$ x $3\frac{3}{4}$ inch. The iron plates can be taken out and put back. To the lower side of the cover are fastened 1-inch thick cleats, which fit into each compartment in the press, when the cover is put on. On each end of the cover is placed a piece of rectangular strong hoop-iron, with a hole in the lower end to slip over a staple fastened to each end of the box. By this means the cover is held down in position, close to the box. In order to make it easy to get the fish out, the press is made so that it can be taken apart when the cover is off. On a piece of plank are placed two iron pinches. When the press is put down on this piece of plank, these pinches throw the hoop-iron fastened on the cover out from the staples, and the cover can be easily taken off. These presses are patented and reckoned to be the best of any in use at the present time. Before putting the fish in the press, three or four strings of cotton twine are placed at an equal distance from each other, in each compartment. The fish is then filled in and care taken that one or two nice square pieces of fish are placed in the bottom and at the top, in each compartment, while the middle is filled with small and irregular pieces. Between each layer of fish is sprinkled some preservaline. One pound to one hundred pounds of fish. The

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press is well filled with fish; it is placed underneath a screw, where the cover is screwed down so far that the hoop-irons catch the staples in the ends of the press and keep them down. The press is then taken from the screw and left standing a little time, and another press put underneath the screw. After the fish have settled in the press, the cover is removed and the strings tied around the bricks, the press taken apart, and each brick wrapped in waxpaper and packed in boxes mostly 40 and 60 pounds, of dimensions $15\frac{1}{2} \times 12\frac{1}{2} \times 5\frac{1}{2}$ inch (40 lb. box) and $15\frac{1}{2} \times 12\frac{1}{2} \times 8$ inch (60 lb. box). The dimensions of the bricks, after being pressed, are $6 \times 3\frac{1}{4} \times 2\frac{3}{4}$ inches, and the weight two pounds. One-pound bricks are made by cutting the two-pound ones in the middle. These are generally packed in crates (small boxes $15 \times 3\frac{1}{4} \times 3\frac{1}{4}$ inch), made of $\frac{1}{4}$ -inch lumber, with sliding cover; five 1-pound packages are put in each crate; and twelve of these again packed into a larger box. Another way of putting up boneless fish is to press it in cylinders 14 inches long inside. The fish in those, after being pressed, are cut according to the marks indicated on the inside of the cylinder, in four equal parts, leaving each brick or roll of fish $3\frac{3}{4}$ inches in length.

WAGES OF PACKERS OF BRICKS.

The packing of Bricks is generally done by women; their pay, when I visited the various factories in Gloucester in 1887, was ten cents per 100 pounds for sprinkling and packing. The skinning is all done by men, who also are paid per 100 of fish, for skinning, dressing and packing.

The following rates were paid them at the time of my visit in 1887:—

Large Bank and large Georges cod...	..25 cents per 100 lb.
Small fish, not cut in boxes, with backbone	
left in	30 " " " "
Small cod, cut, backbone taken out.....	40 " " " "
Cusk, boneless.....	35 " " " "
Hake and haddock, boneless and cut....	40 " " " "
Hake and haddock, not cut, with backbone	
left in.....	30 " " " "

I was told a smart skinner was able to skin and dress 1,200 lbs. of large fish in a day.

DIFFERENT BRANDS.

Every firm has got its own brand. The most in use are, for instance: "Pure Gold," "Silver Brick," "White Clover," "Victoria,"

"Snow White," "Golden Eagle," "Favorite," "Juricka," etc., etc. If one firm brands its best fish "Pure Gold," perhaps another firm will brand their best fish "Snow White," and so on.

PRICES OF COD IN THE UNITED STATES.

Thinking perhaps it may prove of interest to many who have not had an opportunity to make themselves acquainted with the prices of fish in the States, I will refer to the wholesale prices demanded when I visited Gloucester in the summer of 1887:

CURED FISH.

Large Bank and Georges, cured, per cwt.....	\$3.75
Medium.....	3.25
Pickle cured pollock.....	2.25
New large Georges cod.....	4.25
Good.....	3.75
New medium.....	3.62

BONELESS FISH, IN STRIPS, IN 40 AND 60 POUND BOXES.

Best new large Georges cod per 100 lbs.....	\$5½
Choice large.....	5
Best large Bank fish.....	4 ⁷ / ₈
Good.....	4 ¹ / ₂
Choice (B. T. lot).....	4 ³ / ₈
Medium Georges fish.....	5 ¹ / ₈
Medium Bank cod.....	4 ³ / ₄
Hake.....	3
Haddock.....	4
Cusk.....	4
Pollack.....	4
¹ / ₂ cent additional in 20 lb. boxes.	
¹ / ₂ cent additional in 5 lb boxes (crates).	

TWO-POUND BRICKS.

Best new large Georges cod.....	\$5 ³ / ₄
Choice new large Georges cod.....	5 ¹ / ₂
Best large Bank cod.....	5 ¹ / ₄
Best new medium Georges.....	5 ¹ / ₄
Best new medium Bank.....	5 ¹ / ₈
Haddock.....	4 ¹ / ₂
Hake.....	3 ³ / ₄
Cusk.....	4 ¹ / ₄

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ONE-POUND BRICKS, IN FIVE-POUND CRATES—12 CRATES TO A BOX.

1-Pound Bricks XXX.....	\$5 $\frac{3}{4}$
1-Pound Bricks XX.....	5
1-Pound Bricks X.....	4 $\frac{1}{4}$

At the same time smoked halibut demanded :—

In strips (boxes extra charge).....	\$7 $\frac{3}{4}$
In 1 and 2 lb. bricks, 40 lb. boxes (no charge for box)...	8 $\frac{1}{4}$

THE SALTING OF COD-FISH IN BARRELS.

This method of salting fish in barrels is still in use in some of the European countries, chiefly in Holland, Belgium, Scotland, Sweden and France. A small quantity, for home consumption, is also put up in Norway. The whole amount of this cure placed in European markets annually, of late years, may be estimated at about 25,000 to 30,000 brls. What the French put up this way are fish caught off the coast of Iceland. The most of the other nations' fish treated in this way are caught in and around the vicinity of the North Sea. The principal markets are on the European continent. London also takes some thousand barrels in the winter season. The price for good fish varies from 12 to 16 dols. per barrel. Thick, fat fish which are brought out of the water alive, bled immediately, and dressed and put in salt without delay, give the best article. The advantage with this mode of cure is that it can be done direct on board the fishing vessels; that one is not dependent on the weather, that it gives an article which is ready for sale within a few days; that this fish commands a comparatively high price, and when properly put up will keep good for a couple of years. The main principle upon which this cure rests is strong packing, re-salting and thoroughly cleansing of the fish. The Belgians claim their fish to be the best, on account of its being caught chiefly by hook-and-line, got out of the water alive and therefore bled properly, while this cannot be done with fish caught on bul-tows, which often are dead long before they are brought on board. As the cure, or the way of putting up this fish, varies among the different nations, I will give a brief account of each, separately :—

THE BELGIAN CURE.

As soon as the fish is brought out from the water it is bled; before being salted it is split in the ordinary way and washed well with brushes; care is taken that all slime and bloody particles are removed. After the water has drained off it is salted in barrels made from birch wood, face up, except the uppermost layer, which is put face down, with one half a barrel of St. Yves salt, in the summer time, and one-

third barrel of salt in the fall, to each barrel of fish. The barrels are well filled, covered with canvas, and left this way for five or six days. When it is taken up the salt is brushed off and the fish re-salted in new barrels, with a good handful of salt sprinkled between each layer of fish. The barrels are filled with fish to about six or seven inches above the top, and put under a screw, where the fish are screwed down far enough to admit the barrels to be headed up; through the bung-hole the barrels are filled with the old pickle from the first salting, and sowed in the vessel's hold. The Belgians hold the opinion that this pickle gives the fish a nice flavour and keeps it from turning a yellow color. After the vessels have returned home the barrels are opened and looked after, and filled with strong pickle, if found necessary. This fish the Belgians call Laberdan. The last catch of fish is generally salted down on board, as light as possible, and not pressed. This is intended for immediate consumption and fetches a higher price than the Laberdan. This fish is called Landorium, but is not durable. A Belgian barrel of Laberdan contains from 265 to 275 pounds of fish, net, and about 260 lbs. gross. In order to get the fish to fit better in the barrels the napes are generally cut off the fish, and as the fish also are mostly too large to lie straight in the barrel the tails are bent upwards. The napes, together with the tongues, lips and cheeks, are salted in separate barrels and fetch a price from 20 to 25 francs.

THE SCOTCH CURE.

The fish caught off the coast of Scotland is bled as soon as it is brought on board, and after being brought in shore, split and washed carefully. When the water has drained off it is salted in tight vessels, with one quarter barrel of good Liverpool salt to each barrel of fish. In this salt it remains for two days, after which time it is taken up, washed in pickle and re-salted and packed hard in barrels with one-sixth of a barrel of salt to each barrel of fish; afterwards the barrels are filled with strong pickle. The barrels used are made of ash-tree or red pine wood. This fish is mostly sold in London in the winter time but is not kept more than about three months. A Scotch barrel of fish weighs about 300 pounds gross, and fetches a price of from 12 to 15 dollars.

THE DUTCH CURE.

The Hollanders treat their fish in the same way as the Belgians before it is put in salt. Their fish are mostly caught on bultows. To each barrel of fish is used in the winter season one-quarter barrel, and in the summer time one-half barrel of St. Ybes salt; all their barrels are made of oak. While salting the fish it is pressed down by hand

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as compact as possible in the barrels and allowed to settle for three days. After this time has elapsed the old pickle is drawn off and the barrels filled with as much fish as can be got down by a man stamping on the head. When the barrels are headed up they are supplied with strong pickle. After returning home the fish is again looked after, and if sold immediately, generally re-packed. A Dutch barrel of Laberdan weighs about 360 pounds, gross, or the same as the Belgian barrels. The Hollanders also salt the napes, lips and cheeks in separate barrels.

THE SWEDISH CURE.

The Swedes also bleed their fish as soon as it is caught, split and wash it carefully, and salt it down after the water has drained off carefully in barrels made of red pine, with $\frac{1}{4}$ barrel of Lisbon salt to each barrel of fish. When the barrels are filled, they are put down in the vessel's hold and left in pressure for four days. This done, the heads of the barrels are put on top of the fish, and then pressed down by means of shores, wedged tight between the heads of the barrels and the deck of the vessel. When the fish has been left in pressure the above-mentioned time, the barrels are filled again with fish, headed up and supplied with pickle. After returning home, the fish is sorted, re-packed, supplied with new, strong pickle and made ready for exportation.

THE FRENCH CURE.

The fish the French put up in barrels are hook-and-line fish, mostly; as before stated, caught off the coast of Iceland. The fish are bled, split, washed and salted in barrels, with $\frac{1}{4}$ barrel of Lisbon or St. Ybes salt per barrel of fish. After being left in salt for three days, the fish is taken up and washed again in clean sea-water, and re-salted with $\frac{1}{4}$ barrel of salt per barrel of fish. It is again left to settle for three days, after which time the barrels are filled with as much fish as can be pressed down, supplied with pickle, headed up and put away. After returning home, the fish are sometimes re-salted with about 65 pounds of salt to each barrel.

ANALYSIS OF CURED FISH.

The society for the promotion of the fisheries in Norway, have caused the dry cured codfish of different nations to be analysed as well in Norway as in Spain. In order to show the difference in the quan-

tity of nutritive substances in some of these countries' fish, I will state the results according to "norsk fiskritidende":—

DIFFERENT KINDS OF FISH.	per ct. WATER.	per ct. SALT.	per ct. NUTRITIVE SUBSTANCES.	PLACE WHERE THE FISH WAS ANALYZED.
Norway	36 82	15 50	47 68	Norway
"	39 38	18 42	42 20	Spain
Iceland	42 23	19 90	37 87	Norway
"	39 44	18 81	41 75	Spain
American (boneless)	51 30	19 90	28 80	U. States America.
Newfoundland . . .	47 40	15 00	37 60	Norway
French Newf'dland	49 78	18 42	31 80	Spain
" Iceland	46 92	16 56	36 52	Spain

This analysis is interesting, because science here tells us better than anything else, why some nations' fish is a better and more durable article than others, and at the same time also points out clearly the deficiencies of such fish as have not obtained the best reputation in the markets. The American boneless fish, which is dried very little, and preserved with other chemicals (preservative), cannot be taken into consideration in this analysis.

However, it will be seen that the Newfoundland cured fish contain nearly *one-fifth* more nutritive substance than the French Newfoundland bank-fish; and no doubt better results still could be obtained with the Newfoundland fish if more pressing was used during the cure. At the present time, most people in Spain and the other fish-consuming countries in the Mediterranean, are yet ignorant of what nutritive substances the different nations' fish contain—a matter which the French take advantage of, and also helps them along considerably in expanding their markets. In other words, the people do not know that when they purchase French fish they carry home with them *one-fifth* more salt and water than they would have done if Newfoundland fish were bought instead of the French, and that they, for this water, pay the same high price as they do for the fish.

In this direction the above analysis also gives us a hint how to check the French competition, namely, by making known among those people who consume large quantities of French fish, what kind of watery stuff this fish really is, and what would be gained in real nutriment by purchasing Newfoundland fish. By getting certificates from well known and celebrated chemists among their own people, published in the daily papers, magazines and commercial news, as often as possible, followed by recommendations and stating the differ-

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ence in nutriment between the French and Newfoundland fish, and making known among the people in the large fish-consuming cities and districts by circulars, and in every possible way and manner, that by purchasing French fish they buy "the pig in the poke." It is likely that after a little while the people will be convinced and see their mistake; and when this object is achieved, the French will either have to cure their fish in such a way that it will contain about the same amount of nutriment as their competitors' fish (which does not pay them as well), or else be deprived of their fast increasing markets. A nutritive, and at the same time a good-looking article, will always be a great weapon against the French fish, and more so, the more education makes progress among the people.

THE CURE OF STOCKFISH.

This mode of curing codfish is carried out in the open air, and without the use of salt. The fish, after being dressed simply, are hung up in the air to dry. This was the principal way of curing fish in olden times, before salt was produced in such quantities that it became a common article of commerce. As far back as 500 years before Christ, tribes can be traced who made stockfish and pounded it up into a flour, for the purpose of making cakes or bread; and even in the time of Alexander the Great—330 before Christ—a tribe was known in the East Indies, who had no corn, but large quantities of fish-flour.

It was only in the early part of the fifteenth century, that the salting of cod-fish was introduced on board vessels fishing on the banks, and first in the seventeenth century, that cod-fish were cured with salt, and afterwards dried in the same way as at present to any extent.

Of stockfish there are two kinds cured—the round and the split—each of these being again sorted according to size and quality, in many brands, to suit the different markets, which I shall specify further on. At the present time, Norway is about the only country that turns a large part of their catch into stockfish. In 1888 the export of cured fish was 42,816,100 kilogram (842,746 cwt.), while the export of stockfish was 20,112,400 kg. (400,000 cwt.), making a total export of fish 1,242,736 cwt.

In curing stockfish, particular care must be taken with the raw product if a good article shall be obtained. The fish should be bled as soon as it is taken from the water, in order to give the blood a chance to escape; and the fish should be covered with planks, until it is ready for dressing and hanging. In landing the fish, care must be taken that no gaff or pew is pushed into other places than the head,

because if stuck in any where else in the body, ill-looking spots will appear when the fish is cured. The fish should not be trampled on nor exposed to knocks or kicks. As soon as the fish is landed it should be dressed and hung up on the flakes. It is dressed in this way; that the abdomen is cut open in the middle, from the pectoral fins, and down to the anus, thus leaving the fish to be solid a couple of inches about the napes. The head is removed in the usual way, and all the entrails removed, after which it should be cleansed well in sea-water, as well outside as inside, from slimy and bloody substances. This cannot be done too carefully. After the fish is cleansed it is tied together by the tail in pairs and hung up on the flakes. The tying up of the fish is done in this manner; that strings strong enough to bear two fishes are tied into straps just large enough to slip over the tails of two fishes; then, by giving the one fish a twist around, a turn is obtained in the strap, which is sufficient to hold the fish when it is hung up on the flakes. The flakes consist of 8 to 10 feet high stands, on the top of which strong flake longers are placed about two feet apart. The fish are hung up in rows on each longer, by the straps fastened around their tails, in such a way that one fish comes on each side of the longer. Care is taken that the fish are not hung so close that the current of air is prevented from acting upon them. A two-pronged stick is generally used for hanging it up and taking it down from the flakes, which in Norway is called Hjeld.

The management of the flakes is of much importance. These must be placed over dry ground, where there is no grass growing (rocky ground is the best) and not close to houses or wood of any description. The flakes should be high enough to prevent snow from reaching the fish and injuring it during the winter time. They should also be high enough to admit a good draught of air among the fish; and if placed on beaches, to prevent the sea or the spray from reaching the fish. The places around the flakes must be clean and airy. Rubbish and refuse of any kind is favorable breeding places for meat flies and other insects which injure the fish; and if any such stuff is around, it must be removed. Heads or back-bones of fish should not be dried on the flakes or in their vicinity. Scare-crows should be put up, in order to frighten away birds from the flakes. In Norway, in many places they are much troubled by the raven (*corvus, corax*) for if these birds discover fish on the flakes, they will destroy large quantities. The longers should be thick enough to allow the fish to hang clear of each other. The fish should not be taken down from the time it is hung up and until it is perfectly dry; that is to say, it must be hard enough to withstand the strongest pressure of the tip of the thumb in the thick of the flesh along the back, without giving way.

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On the other hand, it should not hang on the flakes longer than necessary, or else it gets distorted. In taking the fish down from the flakes, dry and fair weather should be selected in order not to leave any dampness about the fish when it is stored. It is recommendable to let the air get to the fish as often as circumstances allow when the stockfish is shipped. Should any fish among the stock taken down from the flakes be found not to be perfectly dry, it should be stowed by itself, in order not to injure the other fish.

As can be seen by the foregoing there is very little labour attending this mode of curing fish, and no expense in salt. The fish is left hanging out in all kinds of weather until it is dry, without any other attention than that the few fish which may fall down from the flakes in case the straps break are hung up again in their places.

The round fish is cured in the cold season, while the fish, which is cured during the summer months always are split, and is called Rodskjor. According to an old law passed in Norway, all fish above 28 inches in length should be split; while fish below that length, was allowed to be cured round as stockfish. Another law in 1753, prohibited the making of round stockfish except in the months of January, February and March. Another act again, after these were repealed, prohibited the people from hanging round fish in Lofoden, after the 14th of April, or taking down fish from the flakes before the 1st of June; and in Finmarken, fish were prohibited to be hung round on the flakes after the 15th of May. After this time, all fish which was not cured in salt should be made into Rodskjor (split.) At present fish in Lofoden is not allowed to be taken down before the 12th of June. This law is passed merely to enable all the owners of stockfish hung during the fishing season to be present at the different fishing places at the one time, for the purpose of taking down their fish. The custom is namely this: that the fishermen or other parties, who have got fish hung to be cured as stockfish leave the place entirely, as soon as the fishing season is over, and come back to bring their fish home, or sell it on the spot, when it is cured. Before this law was passed, the people sometimes went up to take their fish down at different times; and when, as often is the case, that fish belonging to different parties are hung close to each other, complaints were sometimes made that one party supplied themselves with fish which really belonged to other parties. The split stockfish (rodskjor) is split right through in two, just leaving enough meat and skin by the tail to bear its own weight. The back-bone is cut out from about three joints below the anus, and the fish hung up on the flakes across the longers by the tail, in such way that one half of the fish comes to hang on each side of the longers. Large fish is also cured this way

during the winter time and spring. Besides codfish (*gadus morrhue*) the cusk (*bromius vulgaris*), the coalfish also, in some places called pollack (*gadus carbonarius*), the haddock (*gadus oglinus*), and the ling (*gadus molva*) are also cured in the same way. The principal markets for this fish is Italy, southern parts of Spain, Holland, Germany and Sweden. A good deal goes also to the United States of America.

The faults which make their appearance on stockfish are the following:—

1. If the fish has been left on the fishing gear any length of time, the skin loosens in different places, the fins get damaged; and the abdomen becomes the colour of the liver. This is reckoned as refuse fish.

2. If the fish has been lying in heaps a while after being landed, it gets flat, and is very liable to turn sour.

3. Frozen fish loosens in its meat, and if exposed to very hard frost it turns soft.

4. If the fish is hung too close on the flakes, it gets raw and sour in places, where the fish has been in contact with each other, and is decreased in value.

5. Fish which has been hung over damp and swampy ground gets covered with black spots and becomes mildewed.

6. Fish which has been a long time on the way, during wet weather, or has not been cured sufficiently during its conveyance, is liable to get wormy.

7. Fish which has not been properly dried through, when taken down from the flakes, is liable to turn sour around the back-bone, and spoil.

8. Fish which has been eaten by birds, or damaged by gaffs or pews, loses in value.

The faults which make their appearance with split fish are generally, that it is not split far enough down towards the tail, and that not enough of the back-bone is removed. If this is not done, the flies will lay their eggs in the corruptible blood in the remaining portion of the back-bone.

The split fish are also dressed in a special way to suit the Russian markets. It is split through the back, but left solid in the abdomen; a cut is made through the uppermost part of the fish, about an inch long. Through this hole the fish is tied on longers and hung up to dry.

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There is no article of fish which is sorted in so many different kinds as the stockfish. The round cured fish is sorted in eight different kinds, and codfish below 14 inches in length (which is called fitling) again in three brands. The split fish is sorted in five brands. Besides the other kinds of fish such as cusk, are sorted in three brands; ling in four brands; pollock in seven brands and haddock in three brands. Then again a distinction is made between codfish cured in the winter and spring, and that which is cured during the latter part of the summer and the fall.

The eight brands which the round stockfish of cod is sorted in, are named as follows:—

1. WESTLOFOTHOLLANDER:—This fish is caught in the west part of Lofoten, which the name also indicates. It is reckoned to be the most valuable of all stockfish. The middle size is 20 inches; it is the smallest and lightest of the merchantable brands, and has got a nice bluish gray colour along the back and the sides.

2. FINE HOLLANDER:—This fish is of about the same size as the first fish, is partly a little more thick or full, but it has not the nice colour.

3. COMMON HOLLANDER:—This fish is a little larger and more full than the preceding brands, the middle size is about 24 inches, it must be clean and of a good appearance.

4. BREMER FISH:—This is larger and stouter fish than the others; its length varies from 26 to 28 inches; it must be clean and of a nice bluish-grey colour and stout or thick around the neck and along the back.

5. SAMFANG (Mixed):—This is fish to which there is not put such requirements, as to the previous brands in regard to thickness and size, but it must be fresh and in good condition, and of good appearance. As a rule, fish from any of the above mentioned brands, which have got some perceptible defect in shape or in colour or have been exposed to more than ordinary frost are reckoned to this brand. The size is variable.

6. LOB (plump fish) is the largest and stoutest fish cured round. Its length varies from 28 to 32 inches; it must have a clean and fair appearance. This fish is not much in use, it has a small value, and for this reason not much is cured of it.

7. MAYER FISH (meagre fish).—This is fish which is not full enough to be reckoned to any of the previous brands; fish left on the fishing gear for a few days if well cured, is generally sorted to take this brand.

8. UDSKUD RUND FISH (Refuse round fish).—This is fish which has been damaged in different ways, such as by being left too long in the nets, hung too close on the flakes, eaten by worms or by birds, or fish in which the liver has dissolved or being shiny and has got spots about the skin, caused by being hung too close or over damp ground.

These are the eight regular brands of round stockfish prepared from the codfish.

The smaller sizes of codfish which are cured to stockfish is called Fitling, these are sorted in these brands:—

1. HOLLANDER-FITLING with a average size of 14 inches, it must be clean and without faults and have a dark grey colour.

2. BREMER-FITLING is smaller but has the same qualities as the former. Its length is not under 10 inches. Of this fish there is very little in the markets.

3. GERMAN-FITLING signify low fish, which is damaged in one way or the other.

Then we again have Hostrundfisk, this is codfish caught in the latter part of the summer and full. This fish, as a rule, is short, fat and of a dark grey colour. Its length varies much; middle size, about 22 inches.

Rodskjer, as stated before, is codfish which are split right through the back and abdomen, and only coherent by the tail; it is sorted in five brands, according to size and quality.

1. HOLLANDER ZART-FISH.—This is thick, fat fish; it must be clean and without faults, and not below 20 inches in length; the middle size is about 22 inches. This is the most valuable brand.

2. WAKKER-FISH.—This fish is not so fat, but must be good, full fish, without faults and of a middle length of 20 inches.

3. HOKER-FISH.—This is the smallest fish, of a poorer quality than the others. The middle size of this fish is about 14 inches.

4. DANISH-FISH.—This is fish of a poor quality and a dull colour, which has slight injuries, such as a little frost-burnt or eaten by worms; its size varies considerably.

5. UDSKUD RODSKJOR (Refuse-fish) is fish which are considerably damaged.

The haddock is sorted in large, small and split, but is most 7 cured round. As the other kinds of fish such as the cusk, ling and pollock are not found in any great quantities in Newfoundland. I

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presume it will be of no interest to describe the different brands in which they are sorted in Norway. Some flounders are also dried in the air without salt and exported to Holland. The fish shipped to the United States of America is mostly of round fish Bruner and Common Hollander, and of split fish: Hollander Zartfish and Wakkerfish. A portion of the stockfish is also consumed in Norway, but it is mostly then prepared in a special way, by steeping in a lye of potash, and is by many considered a favorite dish. The retail prices for Weslofote Hollander fish in Livorno in 1888 was from Lire 75-80 per 100 kg. (220 pounds English weight) duty off, while cured salt fish was sold at Lire 52 to 55 per 100 kilogram cif, in Genoa.

The wholesale prices in Venice, in larger quantities, at the same time were:

Prime stockfish from Brym.....	Lire 78 per 100 kg.
Second " "	66 to 50 "
Prime " Hammrfish.....	79 "
Prime Fitling "	74 "
Prime Haddock "	45 "

all duty paid, with discount. The retail prices for stockfish are always ten per cent higher. At the same time, salt cured fish from Norway was retailed for 72 to 75 Lire per cwt. It must be observed that stockfish is much lighter in weight than salt cured fish.

The duty as well for stockfish as salt cured fish in Italy is five francs or Lire per 100 kilogram. Besides this duty there is charged a municipal tax on all prepared fish consumed in that country. In Venice this tax runs up to 18 Lire per 100 kilogram, but varies somewhat in the different ports. Stockfish can be cured also in Newfand in the colder seasons (spring and fall). However, the market for this fish is not as large as for salt cured fish. When it is to be exported, it is by the means of presses put up into square bundles of dimensions 20x24x29 inches, tied together with strong wire strings. These bundles are supposed to contain about 100 kg—220 pounds. It is also put up into 50 kg. bundles.

PART II.

THE CURE OF HERRING IN EUROPE.

To cure or salt herring properly, in order to meet the tastes of the consumers and bring a good price in the markets, is a work which requires skill and good care. Besides the quality, the nice flavour of a herring depends at the same time also upon how it is treated and salted.

If too much salt or too strong pickle is employed, the flesh of the herring will after a short time become hard and dry, and will be deprived of its real good and natural flavour. The less salt and the weaker pickle can be used, the longer and better it will retain its nice flavour; but on the other hand, if sufficient salt and proper pickle is not employed, the herring will get tainted, and not fit for human food. The art of curing herring as well as other fish with salt depends mainly upon a proper knowledge of what quantity really the different kinds of herring take in the different seasons, and what quantity of salt is required to preserve the herrings for the various markets, and in the different ways, they are to be treated for such markets.

In Europe, the salted herring for export are all put up either round or mostly gibbed or gutted; none as far as I am aware are ripped down the stomach, as they do in Newfoundland, the Dominion of Canada and partly also in the United States. In each of these instances, different quantities of salt must be employed. A round herring takes more salt than a herring which is gibbed and gutted, and these last again more than the herring, which is ripped in the stomach, and all the entrails removed. Again, a fat herring takes more salt than a lean one; a large herring more than a smaller one; and in the hot season of the year, all herring requires more salt than in the cold season.

Besides the proper amount of salt employed to the different kinds of herrings for the various markets and in the different seasons of the year, due attention must also be paid as to how the herring is treated, packed, and what kind of barrels is employed, if a real good article shall be obtained.

The old mode of curing herring in Europe was to pack them in barrels just as they were taken out of the water, with necessary salt without either gibbing or gutting or sorting, and this way is partly

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in use yet in some parts of Norway, where they are shipped to certain markets, in which there is a demand for them in this way. The only exception is, that they are, as a rule, sorted. These are called sound herring in contra-distinction from those which are gibbed or gutted. By this old mode of curing herring, all the blood is retained in the fish, and makes itself visible after a short time by turning the flesh all along the backbone a dark colour. Sometimes such herring when exported to Russia, where all imported herring must be gibbed, are taken up from the salt, gibbed and repacked, just before shipment, after being in salt perhaps for several months. Of course the gibbing of herring in such cases is no good, nor of any improvement in the cure, but it is more a trick used for the purpose of getting the herring admitted into Russia, and to make the people perhaps believe that the herring was gibbed before it was salted. However, this way of curing herring is objectionable, because it will never make a good or durable article, because the bloody substances undergo decomposition before the salt gets a chance to force its way through the skin and flesh, and the herring in the meantime loses thereby its sweet flavor, and will not keep as long as if the blood was removed immediately after it was brought out from the water, and before it was salted. The decomposition takes place first in the right gill of a herring, and spreads, from this place all through the body.

The gibbing, gutting and the cure of the herring, in the way it is performed among the Dutch at present, was first introduced by a Hollander in 1380, and was considered to be such an important improvement that the Dutch government, until the year 1850 gave the crews of their fishing-crafts an annual compensation, under the obligation of oath not to betray the secret of this mode of cure to any other nation. However, when the compensation ceased, the promises also ceased, and at present the Scotch as well as the good Norwegian cure of herring, is based upon the same principle as the Dutch.

In Norway, this mode of cure has not been introduced to any large extent, but it is gradually working its way in among the curers and producers. The great reputation the Scotch cure of herring of late years has gained on the continental markets, is due to the principle adopted from the Dutch; although the cure is not carried out exactly in the same way, still the main principles are based upon the Dutch cure. The food which the herring contain—in Scotland generally designated "gutpoke"—has much to do with the cure. Some of this food is quite poisonous, works itself into the muscular tissues of the flesh, taints and damages the fish right through, in such a way that the herring cannot possibly be cured in any way, and is entirely unfit to use as an article of food. This is the case with herring which

contain a corny, black food (looking something like gun-powder), which by some people is held to be the spawn of squids, which undergoes such a transformation in the stomach of the herring. Whether such is the fact or not, I have had no opportunity to ascertain. Other food, again, upon which the herring feed, works in along the blood veins which run around the back-bone, taints the flesh that surround this, and burns the abdomen. A nasty smell can even be felt at the end of the back-bone of such herring, by tearing the tail apart and exposing the bone. In any case, herring is not fit to be cured before such food is removed. Even if it is ripped open in the stomach, and all the entrails removed before it is salted, the effects of such food upon the flesh is not without injurious consequences. For this reason herring which are caught in seines and kept barred until they are cleaned (which, as a rule, is done in the course of four or five days), are more valuable and give a better article of food than herring caught in nets.

The ripping of the herring down the stomach and the removal of all the entrails and blood, before it is put in salt, is certainly the most proper and complete mode of treatment; but as the continental consumers of herring generally value either the fat or the milt and roe very much, this way of treatment finds no acceptance in Europe. It has, therefore, to be cured according to the consumers' taste, with the fat, milt and roe left in the fish, in order to meet a demand in the markets.

OBJECT OF GIBBING AND GUTTING HERRING.

The object of gibbing and gutting is:—

1. To liberate the herring from the blood, which is done by the removal of the gills, the throat and heart.
2. To remove such ingredients as are already in a state of decomposition (such as the stomach and intestines), or such matter as is most apt to decay, before the salt has a chance to penetrate into all parts of the herring.
3. To give the pickle a better chance to act upon the herring, as well from the inside as from the outside, through the skin.
4. Finally, to lessen the quantity of salt used in the cure of herring, and thereby improve the flavor of the fish.

In Norway, as a rule, only the throat, pectoral fins, the heart, and in some cases the gills, are removed. By this operation, which is done either by tearing out a piece in the throat with the fingers, or by clipping it out with a seissors made for that purpose, the first object (to remove the blood) is obtained, and even this only partly.

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The Dutch and the Scotch remove the gills, throat, pectoral fins, liver, heart, stomach, crown or blind gut, if the herring is intended for export to foreign countries; and by this operation the full object of gibbing and gutting is obtained. What is left then is only the milt and roe, which some people are very fond of. The blind-gut is claimed by many curers and consumers to give the herring a nice flavor, and for this reason it is often allowed to remain.

NORWEGIAN, SCOTCH AND DUTCH METHODS.

Why the Norwegians, as a rule, do not gut their herring like the Scotch and Dutch is that the most of their herrings are caught in the fjords with seines, and kept barred until what food the herrings may contain has worked out. The Scotch and Dutch catch their herring with nets in the North Sea and outside the coast of Scotland, and have therefore no chance to get the food worked out of the herring in any way, but removes instead thereof the stomach. The fat herrings, caught in the summer time, are, as a rule, most infected with injurious food. It is recommendable to remove the blind-gut with the surrounding fat such herring contain, which is caught during the summer months, because the fat at this time is generally loose and dissolves into oil, which again easily becomes rancid, and injures the stomach of the herring as well as the pickle. Fat herring in which the stomach is ripped open, and all the entrails removed, sometimes also shoot their fat after being salted. This, as a rule, is due to the fact that such herring have not been put quick enough in salt, or have been exposed to heavy pressure, by being packed together in too large quantities, while being conveyed to the curing place, in fresh condition. The herrings caught in the North Sea, on the coast of Scotland and Norway, are, on an average, smaller than the herring caught in Newfoundland, on the coast of Labrador and the American coast; but with the exception of the Labrador herring, are considered to be a superior quality. The eating of these herring does not, as a rule, when well cured, cause a rising in the stomach, which often is the case with herring cured on this side of the Atlantic Ocean. On the coast of Iceland there is caught in the summer months and fall, a herring which resembles the Labrador herring very much in fatness and size. These are, by the Norwegians, often salted down round in barrels, and gibbed and re-packed after the vessel's return home in the fall—a fact which contradicts the idea many people have got in Newfoundland, that the Labrador herring is too fat to be cured round, even when gibbed and gutted. I have myself caught these fine herring on the northern coast of Iceland, being that fat they could not be smoked, on account of the oil dropping from them in such large quantities that the smothered fire was put in a blaze. These Iceland

herrings are mostly caught in seines, and kept barred till the food is worked out of them before being salted. This accounts for the fact that although large and very fat, they can be cured round without being damaged.

NEWFOUNDLAND HERRING.

Although the Newfoundland herrings are large, they cannot compare with the best Labrador or European herring in fatness and fine flavor. Still the good winter herring, which I have seen in Placentia and Fortune Bay, are fully equal to the herring caught in Europe in the winter and spring, if not better; and if put up in a good European way, would, I consider, be fully able to compete with those herring in the American markets. Whether these large herring would suit the European markets is a question. The continental people, as a rule, do not care much for very large herring. They consider the flesh in those too coarse.

QUALITIES OF THE GOOD HERRING.

Concerning the nature of the fresh herring, it is required in order to obtain a good article, that the herring also possess certain qualifications, such as sufficient size and maturity, fleshiness and fatness. A lean, dry, dismembered or half rotten herring, can never give a good article, even if it is cured ever so well. A small herring, which has not reached the full state of maturity, fetches only small prices in the markets. Of much importance is also the development of the sexual organs. If these are in a far advanced state, the herring loses in fatness and flavor. These should be firm and the whole flesh penetrated with a certain quantity of fat. Large amounts of fat around the blind-gut is a sign of the herring being fat right through the flesh. As a rule, ocean herring (such herring as pass most of the time in the ocean, and only approach the coast for reproductive purposes) are considered superior to the herring that keep themselves close to the coast or in the bays all the time. Of these herring again, those which are caught in deep water are better than those caught in shoal water. A first-class herring is known by its small head, short and plump body; is broad across the back and plump towards the tail, and has got a great depth from the back to the abdomen, which gives this a well-rounded shape.

IMPORTANCE OF EARLY SALTING.

In order to obtain a good article of salt cured herring, it is necessary that the herring is liberated from its food, and put in salt as soon as possible after being brought out from the water. Even if the

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quality is ever so fine, a good article can never be had if it is not properly treated during the whole cure. The Scotch herring cannot get the official crown brand except they are salted at least twenty-four hours after being brought out from the sea. As a rule the curers do not care about herring which is more than twenty-four hours out of the sea before they are landed, and only take those at a low figure. In Holland even a distinction is made between the herring, which are taken out first, and those which are taken last from the nets. The cure of herring on board the fishing crafts commences therefore, if circumstances allow, soon after the nets are hauled in. To leave the herring exposed to the hot sun, while being conveyed to the salting place, or to leave the herring in the nets until the shore is reached, if the catch has taken place a long distance off the shore is objectionable. An old law in Norway, of 1775, even prohibited people from taking such herring from their seines, in the summer time, before 10 o'clock in the evening and after 5 o'clock in the morning, if it was going to be salted for export.

EUROPEAN CLASSIFICATION OF HERRING.

The herring in general are classified in Europe according to the development of the sexual organs, in three main branches: "fat herring;" "full herring" and "spent herring."

1. **FAT HERRING** (matties are generally reckoned as fat herring) with very little or no development of the sexual organs at all, but much fat about the blind gut.

2. **FULL HERRING**: with full developed but firm and dim milt and roe, and little or no fat about the blind gut. Of these the male is considered the most valuable as an article of food. A poorer quality of full herring are those which have got their milt and roe loose and transparent.

3. **SPENT-HERRING**:—These are fish which have spawned and contain no milt, roe or fat. A distinction is also made between those spent herring that have spawned recently, and got their sexual organs much collapsed, but not yet gained much in flesh after spawning and those which have spawned some time previous, with less collapsed sexual organs and a little fat beginning to form around the crown-gut. Among the fat herring are also found in larger quantities a smaller herring, which have not reached maturity; but still are fat and well fitted for salting purposes. These are reckoned or sorted as small-sized "matties." Each of the three main divisions of herring are again sorted according to size.

BEST SALT FOR HERRING.

In regard to what kind of salt is the most suitable for salting herring, it is difficult to give any one sort the preference. The choice of salt depends much upon how the herring is going to be cured, and upon the size and quality. The main thing is that the salt is clean, and that it is used in proper quantities. Fine and watery salt melts quicker, but give weaker pickle. In cases, where it is of importance to form pickle speedily, fine salt is preferable; while coarse salt is better for use in filling and repacking, or when the herring is intended for export to hot climates, or to be kept in stock for any length of time. The Scotch curers use Liverpool salt, the Dutch light Cadiz or Lisbon salt, while the Norwegians use St. Ybes salt. It is of much importance as formerly stated to put the herring in salt as quick as possible, if a first-class article shall be obtained. For this reason the Scotch, as the herring is landed, sprinkle it heavily with salt in bins or vessels made for that purpose, before it is gibbed and gutted. Generally they use one barrel of Lisbon or coarse Liverpool salt (or sometimes both mixed) to about 10 barrels of herring. By this means the herring keep their scales better and brighter, and can also be handled better and quicker when they are afterwards gibbed and gutted. The Hollanders roll their herrings in trays filled with fine Liverpool or St. Ybes salt, as soon as they are gibbed and gutted, before they pack them in barrels; and this work is done very precisely. In Norway no sprinkling with salt as a rule is used before the herrings are gibbed or packed in barrels, but instead thereof, they have to use more salt in packing than the Dutch and Scotch. The sprinkling of herring with salt as soon as they are landed or brought on board of the vessels is considered also to improve the flavour of them very much.

PACKING HERRING.

In packing the herring in barrels, it is recommendable not to pack them too tight before they have shrunk in the salt, and also to pack herring of the same size and quality right through the whole barrel. The packing is performed differently among different nations. In Norway the herrings are packed slantways on their back, while the Scotch and Hollanders pack them fully on their back. By this last mode (which no doubt is the best) the herring get a more round and thick appearance in the back; and it has also this advantage, that the pickle has got a better chance to get in and saturate through the abdominal cavity of the gutted herring. After the herring has shrunk in the salt, the barrels are filled up again, and put away, but care is taken that the herring is not packed too hard. As long

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as the barrels are left to remain still, there is no need of hard packing, but when they are to be shipped, it is recommendable to repack the herring so tight that they do not move about, even if the barrels are handled ever so roughly, so that the receiver may be exempted from filling the barrels again after they have reached their place of destination.

HERRING BARRELS.

The quality of barrels used for salting herring is of much importance in order to obtain a desirable product. If too soft wood is employed, the pickle will work through the staves, the herring become dry, and be damaged within a short time. Among the foliferous wood in Europe, the populus (poplar) is considered least answerable; and among the conifers, the spruce or fir are less suitable than the red pine wood, because the former is generally knotty and more ready to get saturated with pickle or water. Good hard and clean spruce, which is cut fresh and has not been soaked in water, may compete with the pine when it gets properly seasoned. The Hollanders use mostly barrels made of oak, the Scotch, barrels of birch or beech, and the Norwegians, barrels of spruce and red pine wood. Staves made of birch are brittle, and apt to twist. In Scotland the regulations for making herring barrels are that the staves shall be not less than half an inch thick, and not wider than six inches, except the oak staves, which may be seven inches wide; and that the bottoms should be at least of the same thickness as the staves, and none of the pieces of which it consists be made wider than eight inches. The usual thickness of the staves in the Scotch herring barrels are from 9-sixteenths to 10-sixteenths of an inch, and the bottoms are generally made 3-fourths of an inch thick. In Holland there was a law passed enacting that a herring barrel should be manufactured of at least 13 staves (which makes every stave on an average $5\frac{1}{3}$ inch wide), and that no stave should be less than $\frac{3}{8}$ of an inch in thickness. In Norway the staves as a rule are made $\frac{5}{8}$ inch thick, and the barrels mostly made by machinery. The Scotch barrels are generally full-banded for export to hot climates in the summer time. They are also furnished with an iron hoop on each end. The Dutch barrels are furnished with 18 to 20 hoops (divided 5 or 6 on each end, and four on each side of the middle), while the Norwegians have only 12 to 16 (divided three and three, or four and four) or if iron hoops are used, they furnish each barrel with iron hoops.

The normal capacities of the European barrels are:—

The Dutch barrels.....	125	litr.....	33	gallons	} Wine Measure
The Scotch “	121.2	“	32	“	
The Nor'gian “	116	“	30.6	“	

1. The Dutch barrels should, according to an Act which was repealed in 1858, have the following dimensions:—

The whole height outside.....	710 m.m.		28 $\frac{1}{8}$ inch.
The length between the crosses	654 m.m.		25 $\frac{7}{8}$ "
Circumference of bilge.....	1700 m.m.		67 $\frac{1}{10}$ "
Diameter of bottom.....	446 m.m.		17 $\frac{5}{8}$ "

2. The dimensions of the Scotch herring barrels are generally as follows:—

The whole height.....	30 $\frac{1}{2}$ inches.
Diameter of bilge outside.....	21 "
Diameter of ends outside.....	18 "
Length inside.....	26 "
Diameter of bilge inside.....	19 $\frac{1}{2}$ "
Diameter of the ends inside.....	17 "

1. The dimensions of the Norwegian barrels are:—

Total height.....	29 inches.
Circumference of the ends outside.....	57 "
Circumference of the middle of the bilge.....	64 "
Diameter of the bottom and head.....	18 "
Length between the crosses.....	26 "

In Norway a movement has been made lately to get a law according to which all barrels for shipment of herring should be manufactured of a certain kind of wood, and of certain dimensions; but as far as I am aware, such act has not been passed yet. If the barrels are made of fat spruce or red pine, and also of oak, the herring will take a flavour from the barrels which some people like very much, but others again do not care for. In Scotland it was prohibited to salt herring in barrels manufactured of red pine until the year 1874; and for many years back a similar act or law existed in Norway; but this was repealed again on account of the Russians, who consumed large quantities of salted herring, and valued the Norway cure very much on account of the resinous taste the herring got from the red pine barrels. Some people again value the Dutch herring very much on account of the taste or flavour they receive from the barrels. To keep the barrels from shrinking, it is recommended to put a little pickle in them while they are kept in stock.

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THE NORWEGIAN CURE OF HERRING.

As formerly stated, the largest quantity of herring in Norway is caught in the fjords by seines, and kept barred until what food the herring may contain, is worked out in the natural way before they are taken up, dressed and salted. As a rule the herring are salted in the vicinity of the places where they are caught, so that they can be put in salt almost alive, which is of the utmost importance in order to obtain a good article. In this way they have an advantage over the Scotch, who have to go far off the coast for their herring, and cannot get them in salt before they reach the shore, which often takes a long time. They have an advantage over the Dutch, because although they salt their herring on board of their vessels soon after they are caught, still they may have been dead several hours in the nets before they are hauled on board, and at all events none of the herring taken in drift-nets or other nets, can be deprived fully of the injurious food they may contain as they can when barred in a seine. When brought to the shore, or salting places, from the seine, the herrings are gibbed in this way;—that a triangular piece of the throat, large enough to admit the heart and the pectoral fins to be removed, is cut out by the means of scissors made for that purpose, or by a small knife (some also use the fingers). This cut should be made deep enough to divide the large blood-veins situated close to the neck-bone, in order to remove the blood it contains. Sometimes also the gills are removed especially on the full herring caught in the spring.

SALTING AND PACKING.

Generally a large enough crew is employed, to admit the gibbing and the salting to take place at the one time. On account of the herring caught in seines being always mixed, every gibber has got placed before him or her so many barrels or tubs as the herring are to be sorted in (from three to five); and according as they are gibbed, every herring is also at the same time, by the gibber, sorted and placed in the various barrels or tubs to which they belong. The salter then takes the herring and packs them in new barrels, which lately have been soaked in sea-water, slantways on their back, with $\frac{1}{4}$ barrel of St. Ybes salt to one barrel of herring. The herring are packed loosely, one lays across the other the whole barrel through. The uppermost layers are packed sometimes slantwise back up. Some packers put from $1\frac{1}{2}$ to 2 gallons of pickle (made of $\frac{1}{4}$ brl. of salt to one brl. sea-water) on the herring soon after it is salted, and head up the barrels immediately. Others again let the barrels remain unheaded for one day before they fill them with pickle. Before the barrels are headed up, a layer or two of herring are generally put into the barrels, in

order to fill up the empty room caused by the shrinking of the herrings. By putting the pickle on the herring soon after they are packed, the salt dissolves quicker and saturates the herring more speedily, so that the contents of the stomach (provided the food is liberated) hardly has got any injurious effects upon the durability of the herring. After the barrels are headed up, they are broached in the head and blown into by means of a brass pipe containing a valve, which is put down in the hole, and if found tight, the hole is plugged up as soon as the air has escaped; if not, they are made tight in the places where they are leaky, and blown over again before they are stowed down on board the vessels.

SHIPPING HERRING.

After reaching the port of shipment and before being exported, the herring are repacked and the barrels filled with the original pickle which was formed first; and if this does not hold out, new pickle is made to supply what is wanting. As a rule, the herring are repacked in such a way that out of four barrels salted in the fishing-places, from $3\frac{1}{4}$ to $3\frac{1}{2}$ barrels of herring are obtained, when packed for shipment. They never, as a rule, pack their herring as light as the Scotch or Dutch do, except the herring is specially to be put up in such style.

SORTING THE HERRING.

The herring is sorted according to quality and size agreeable to the producers' or curers' individual judgment, as there has been no official culling system since 1857, and no law in existence at present, that fixes certain rules or regulations according to which the herring is to be sorted. Therefore the sorting also varies a little in different years, according to the quality and size of the herring caught. Some years back the herring was sorted into four sizes: *Kjobmandsild* (merchantable), *Middelsild* (medium), *Store Christianiasild* (large Christiania herring), and *Small Christianiasild* (small Christiania herring). Of these, the merchantable was the largest and the small Christiania herring the smallest; and each of these sorts of herring was signified by the initials K. or M., or C. or CX., or else with one, two, three or four strokes. At present the herring are sorted in six sizes—one size larger than the merchantable and the other smaller than the small Christiania herring.

The most rational method is to have a certain length, according to which the herring should be sold. This has been proposed and also recommended by the Society for the promotion of the fisheries in Nor-

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way. The length proposed, which also corresponds as near as possible with the different sizes the herring is sorted, are as follows:—

DESIGNATIONS.	The various marks employed which signify the same kind of herring.		LENGTH OF THE HERRING.			
Large herring . . .	o stroke	"	KKKK.	beyond 300	m. m.—12 $\frac{1}{8}$	inch.
Merchantable. . .	1 "	K.	KKK.	from 300 to 271	m. m.—12 $\frac{1}{8}$ to 10 $\frac{3}{4}$	"
Medium	2 "	M.	KK.	" 270 to 241	m. m.—10 $\frac{3}{4}$ to 9 $\frac{1}{2}$	"
Large Christiania	3 "	C.	K.	" 240 to 211	m. m.—9 $\frac{1}{2}$ to 8 $\frac{1}{2}$	"
Small do	4 "	CX.	M.	" 210 to 181	m. m.—8 $\frac{1}{2}$ to 7 $\frac{1}{8}$	"
Smallest do	5 "	CXX	C.	below 180	m. m.—7 $\frac{1}{8}$	"

Although so confusing to have so many different marks for the same kind of herring, still these marks have, during a length of time, worked their way into the domestic herring trade; and as the old people would not give up their way of marking their herring barrels, according as the new was introduced, they are still in existence; but at present, the latest introduced marks quoted in the last rubric, are best known in foreign countries, and therefore used on exported barrels of herring.

In 1753 there was a law passed in Norway, according to which all herring or other salted fish should be culled and branded by the culler with an official mark, before it could be sold in the domestic markets or exported to foreign markets; but this law was repealed in 1857, and since that time no culling nor official marking of herring has taken place.

A Norwegian herring barrel weighs about 100 kg., 220 $\frac{1}{2}$ pounds.

THE SCOTCH CURE OF HERRING.

As soon as the herring is landed and sprinkled with salt, the gibbing and gutting take place. This is performed in the following manner: The herring is held in the left hand, stomach up, in such way that the head reaches beyond the thumb and forefinger (index.) With the other hand a small straight-edged and sharp-pointed knife is pushed in, just below the gill-lid, on that side of the herring that shows towards the right hand and forced right through the throat, close to the neck bone, so that the point of the knife comes well out on the other side. The forefinger is then pressed against the head, and the thumb across the pectoral fins. A little cut with the knife is first made down in the direction of the tail, after which it is given a twist, and a cut made close up under the pectoral fins. The throat is grasped between the index and middle finger (on the right hand), and with a smart jerk, the intestinals, (stomach, crown-gut,

liver and heart,) along with the gills and pectoral fins, are torn out, leaving only the milt or roe to remain in the herring. When the herring is intended for export to the continental markets, the crown-gut is often allowed to remain.

Another way of gutting herring when these formerly have been clipped, is to put the thumb behind the gills, and with a jerk from the top and downwards, break the gills loose from the head; when these then are taken out, the esophagus (gullet) and the stomach follow, because all these are cohesive; but this way is seldom in use anywhere else than in some cases in Norway.

SALTING AND PACKING HERRING IN SCOTLAND.

According as the herrings are gibbed and gutted they are sorted in baskets and put into the rousing tubs, where they are rolled in small Liverpool salt, before being packed in barrels generally made of birch. In these the herring are packed fully on their back, with a small plate full of salt sprinkled between each layer of fish. The one layer of herring is put across the other, the whole barrel through, and each layer furnished with two "head-herrings," put on their sides. The barrels are filled until a couple layers of fish above the chime, or top, and covered with wooden covers made for that purpose. In this way they remain two or three days, after which time, when the herring has settled, the barrels are filled up again with fish from the same packing, headed up and put down on their sides. Every second day, as a rule, the barrels are given a little turn around, until the last packing (bung-packing) takes place. A look-out is, during this time, kept upon the barrels, that none of them are leaking. In order to obtain the official crown brand, the herring must have been in salt at least ten days, exclusive of the first day of packing and the last day filling up or bung-packing. When the barrels, after such time, or later on, are going to be made ready for shipment, the pickle is drawn off through the bung-holes and these plugged up; the barrels are then opened and more herring of the same packing pressed into the barrels, either by the means of a common press, or else by the way of a man pressing the herrings down, either by hand or by trampling them down after a small barrel-head had been placed on top of the herring. Care is in the meantime taken that the herring is not pressed that tight that no room be left for the pickle. The object with this last and tight packing is to prevent the herring from being shaken about in the barrels during the time of conveyance and to save the recipient from the trouble of re-packing the barrels after they have reached their place of destination. After a sufficient quantity of herring is pressed into the barrels, they are headed up and filled,

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through the bung-hole, with the same pickle which was drawn off formerly, after being strained. The bungs are then put in tight, the hoops driven home and the barrels blown; after they are joined tight the uppermost hoop is nailed fast, the blow-hole stopped up, and they are in a condition ready for shipment. If the herring is to be exported to countries outside the European Continent, or to hot climates, it is generally, when the bung-packing takes place, emptied out of the barrels altogether; the crown-gut is removed, if it is left, and the herring rinsed in clean water, and re-packed with coarse Liverpool salt. In place of using the original pickle the barrels are then filled with new pickle made of clean salt. All these barrels are full banded and furnished with one-inch wide iron-hoop in each end. In order to obtain the official crown brand, such barrels should contain no less than 212 pounds of herrings, exclusive of salt and pickle. A good many of the Scotch herring are also packed in half barrels.

BRANDING—ITS VALUE.

The system of culling, along with the official crown mark on all exported herring barrels, has contributed more to the good reputation the Scotch herrings have gained in the continental markets than many may imagine.

The dealers, on reception of Scotch herring with the crown brand, are satisfied that the barrels really contain what they are branded for, in regard to quality and weight; and this has given them such confidence in the Scotch herring that these are received and approved of without even being opened, while the Norwegian herring barrels, since the official branding was abolished in 1851, must be opened and re-packed before the recipient can sell them, which often causes a good deal of inconvenience. The Scotch herring is sorted and branded according to the treatment or cure and the development of the sexual organs in:—

CROWN P. FULL BRAND.—Barrels obtaining this brand must contain all fine, well cured, large, full herring, and not mixed with herring of a poorer quality, nor with spent herring, nor matties, which have not got their roe or milt fully developed.

CROWN P. MATTIES BRAND.—Barrels obtaining this brand must contain fine, rich herring, with small milt or roe, must be well cured and not be mixed with full, spent, broken or dismembered herring.

CROWN P. SPENT BRAND.—Barrels with this brand should contain spent herring (herring, with their sexual organs, more or less collapsed after spawning), properly gibbed and cured, and all full herring, matties, broken or dismembered herring sorted out.

CROWN P. MIXED BRAND.—This brand is used for mixed herring (such herring as cannot be sorted as full, matties or spent). The mixed herring should also be properly gibbed, packed and cured, and no dismembered herring be packed in the barrels.

CROWN P.P. RE-PACKED BRAND.—Barrels with this brand should contain herring which has been in salt at least ten days, exclusive of the day of packing and the day of re-packing and branding. Further, this herring should, when they are re-packed, be emptied out of the barrels in which they were first packed or cured, the crown-gut be removed, and the herring be rinsed and re-packed, with sufficient salt, in the same barrels, and supplied with new, strong pickle made of clean salt. The barrels should be full-banded and furnished with a one-inch wide iron hoop in each end.

LOZENGE BRAND.—This brand is used for herring which formerly has been bung-packed, and branded, but afterwards re-packed in the same way as is required, in order to obtain the re-packed brand. The lozenge is branded just below the crown brand. In case new barrels are employed, they are branded with the crown brand and the lozenge in the same way.

THE DUTCH CULE OF HERRING.

The most of the Dutch herring are caught at sea in drift-nets and cured on board of the vessels. If there is a chance, the dressing (gibbing and gutting) takes place according as the nets are hauled on board and the herring picked out of them. The Dutch way of gibbing and gutting herring is about the same as the Scotch; the only difference is that the crown-gut is allowed to remain in the herring, as it is considered that the fat which is attached to this gives the herring a nice flavour. After the knife is put through the throat, the cut is at once made up towards the pectoral fins, thus the opening is made smaller than in the Scotch herring.

According as the herrings are dressed they are sorted in baskets, and from these, about a couple of hundred at a time are put into large trays, filled with fine Lisbon or St. Ybes salt, and rolled in this salt. After the herring is carefully and well rolled in the salt, it is packed in barrels, back down, the same way as the Scotch, with Lisbon salt sprinkled on the top of each layer of fish. When the whole catch is salted down, a bucket of *blood-pickle* (made of sea-water and the leavings after the dressing) is put over the herring and the barrels headed and put down in the vessels' hold.

PACKING AND SHIPPING THE DUTCH HERRING.

The object of heading up the barrels so soon is to prevent the herring from being affected by the air. In this state the barrels remain for a time of from six to ten days, when they are taken up and filled with herring of the same packing, after the pickle first is drawn. This filling or sea-packing is pretty compact, and it takes about three barrels to fill four of them. After the barrels are filled, the original pickle, after being strained, is put over the herring, and the barrels headed up and blown, and if found tight put back into the hold of the vessel. It is considered of importance not to undertake the filling of the barrels too early, as the herring, in such cases will be shrivelled; but on the other hand, it should not be performed too late, because if so, the herrings, by being tossed about in the pickle, while the vessel is rolling in the sea, loses a great deal of their scales. After the vessels arrive home, the barrels are again filled with herring and supplied with the original pickle. In this last filling, it is generally estimated that thirteen barrels of herring in a fit state for shipment are obtained from fourteen sea-packed barrels. A large quantity of herring is also re-packed in small kegs—one-sixteenth part of a barrel, and containing from 45 to 50 herring. This especially is for the American markets, while a smaller quantity are also packed in half-barrels, but these do not take very well. A Dutch barrel of full, selected herring, with milt and roe, contains about 800 herrings, which weigh from 110 to 115 kilogram ($242\frac{1}{2}$ to 254.6 pounds) net, exclusive of salt and pickle.

SORTING THE DUTCH HERRING.

The Dutch herrings are sorted according to the development of the sexual organs, in four qualities:—full herring (vol herring branded VOL); matties (maatjis branded M); spaw herring (IJlen branded IJ or IJLE); and herring which have recently spawned (kuit branded KZ); besides herrings which have not been packed before the day after they were caught are branded O. Each of the first three brands are again sorted in three or more qualities, and branded number one, two and three. All herring which on account of so large a catch could not be cured the same day, but had to be left over a night before they were packed, together with torn bellies, or chafed herring, are sorted according to quality, as number three, while all herring in good condition and free from faults, as No. 1 and No. 2, according to quality and treatment. Distinction is also made between herring caught in the open sea, near the coast, and in the Zuider Sea; and the barrels are generally furnished with a mark signifying the place and the year in which the herrings were caught. Before the official system of cull-

ing was abolished, in the year 1878, this was branded on the bilge of the barrels (or if the herring were packed in smaller packages on the most convenient place) by the culler, in such manner that a royal crown was branded in the middle, and the other directions in letters on either side of the crown. For instance :—

1890.
Z
V.  V. } This brand would signify full herring caught in the North Sea, in the year 1890.
VOL.

1890.
K  V. } This brand would signify matties caught off the coast in the year 1890.
M.

1889.
Z.  V. } This brand would signify spent herring caught in the Zuider Sea in the year 1889.
I. J.

It was also customary to brand the barrels which had been culled with the letter Wr., which meant "wrakken" (culling) after VOL. M. or I. J.—for instance, like (VOL. Wr.). Since the official system of culling was done away with, the branding is often deficient and has also changed a little: for instance herring exported to America are branded :—

1889.
W  S. } This would mean selected superior full herring caught in the year 1889, which has been culled.
VOL Superior.

The Dutch herring are also sometimes sorted as male and females and packed in small packages containing either all milt or all roe herring.

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CONSUMERS' TASTES TO BE CONSULTED.

It is an important point to cure the herring according to the consumers' taste and not according to one's own, and to put them up in packages suitable for the different markets. Most of the continental people in Europe hold the opinion that the original pickle (blood-pickle called) gives the herring a nice flavour; and it is also held that the Dutch herrings are superior to any other, because they are salted on board immediately after being caught, and the motion of the vessel has a beneficial influence upon the pickle and the herring. The Dutch believe much in the original pickle; and when this gets short, they even make pickle of the fresh offal after gibbing or gutting, instead of making pickle of clean salt and water. A good pickle should have a mild and sweet taste. If the pickle commences to get a disagreeable taste, it is a sign that the herring has not been salted satisfactorily, and that the herring will spoil within a short time. In such cases it is recommendable to do away with the bad pickle, if the herring still is good, and supply the barrels with new pickle, made of clean salt and water.

HOW THE AMERICANS LIKE THEIR HERRINGS.

The European herring are mostly consumed among the continental people in Europe, and the European population of America. These people seldom cook their herring, but eat them in the pickled state, after being soaked in fresh water, or pack them up into salad, or in pickle, in various ways, made of vinegar and spices. For this reason they do not care for a herring, which is over-salted, and hard in the flesh, or deprived of its flavour by too much salt, nor do they care for too large herring with coarse flesh, nor for lean herring; but prefer a middle sized one, with rich, fine and tender flesh, salted as mild as possible. They appreciate a herring of such a quality and so cured, that it almost melts away in their mouths, when it is eaten. The Dutch reckon they use in all one barrel of Lisbon salt to five barrels of herring in the hot season, and one barrel of salt to six barrels of herring in the colder seasons of the year.

A SHORT VIEW OF THE EUROPEAN HERRING BUSINESS IN THE UNITED STATES OF AMERICA.

Of the European herring the Dutch cure has gained the widest markets in the States. The export of herring to the United States from Holland has increased largely of late years, and at the same time also the demand for the best and finest qualities, which has become an universal article of food among a large number of the inhabitants.

The largest demand for Dutch herring is in kegs, one-sixteenth part of a barrel, and has got the following dimensions :—

Total height outside.....	10 $\frac{3}{4}$ inches.
Length between the crosses.....	9 $\frac{1}{4}$ "
Diameter of the middle of the bilge inside.....	8 "
Diameter of the ends of the keg inside.....	7 "
Diameter of the bottom or head.....	7 $\frac{1}{4}$ "
Thickness of the bottoms and the staves.....	$\frac{1}{4}$ "

These kegs are made of oak and banded with either 8, 14 or 16 wooden hoops. The staves in the chime at the bottom end of the keg are of the same thickness as the stave right out to the end, while in the head end they are slanted off towards the end. The export of herring from Holland to the States in these kegs runs up to about half a million every year; besides they export about 5000 barrels and a few half-barrels annually to America. Half and quarter barrels do not seem to take very well in the United States.

Herrings packed in one-sixteenth kegs are classified thus:—

Dark herrings in kegs with 8 hoops contain	50-55	Voll Herring.	} Roe or Milt herring or all milt herring.
White " " 14-16 " "	45-50	Supr. do	
White " " 14-16 " "	45-50	Sel. sup. do	

One of these kegs containing about 15 $\frac{1}{2}$ pounds of herrings, exclusive of the pickle. A barrel containing from 242 to 254 pounds of herring net, as before stated. Herring packed in barrels made of hardwood, fetch from 50 cents to one dollar higher price than herring packed in softwood barrels.

The duty on pickled herrings is $\frac{1}{2}$ cent per pound, which brings the duty on a Dutch barrel of herring up to about \$1.20, or \$1.27, and duty on one-sixteenth kg. to about 8 cents.

SEASON FOR HERRINGS IN THE U. STATES.

The first Dutch matties arrive in the States in the month of June—"Voll" herring arrive in the latter part of July, but the great demand for and sale of herring commences about the first of September and continues until the middle of November. From this time and until the month of February only a small business is done in herring in the States. The season for demand and sale open again about the first of February and continues to the middle of April. The stock of herrings are as a rule disposed of before the hot weather sets in. It is of no use to keep herring in stock the summer over, in the States, or to send old herring there, because these cannot be sold, and will only bring the shippers heavy loss. The people who consume European herrings want to get a fresh and newly cured article.

PRICES IN THE UNITED STATES.

The prices on Dutch as well as other herrings vary often, and like other articles are regulated by the supply and the demand. Sometimes kegs which contain only milt-herring will fetch from 15 to 20 cents more than kegs, which contain milt and roe herring mixed. Certain brands of selected superior herring packed by careful shippers, also fetch higher prices, than the common packing. The average prices for the kegs of Dutch herring are from 40 to 70 and 110 cents; and by the barrel from 9 to 10 dollars, according to quality and packing.—

BRANDS.

All the Dutch exporters brand their barrels and kegs with a certain trade mark, of which the purchasers have taken notice, so that when a good article under a certain trade mark has been obtained, the demands for such brands always increase, which again has encouraged the parties, who took the pains to put up a real good article to continue to do so, because thereby they always secure a ready sale at profitable prices.

TRADE CUSTOMS.

Almost all herrings are shipped on consignment to the States; formerly the consignee sometimes used to advance cash for consignments, but lately this system is more and more done away with, because the consignees often received poor articles, which could not be sold satisfactorily. The custom is therefore mostly now to forward the consignors the accounts and remittance, as soon as the herrings are sold. By this system the consignees claim, that the consignors are led to ship better qualities and better cured and packed herring; and that by this system the herring is better preserved and has a chance to increase the demand. One of the largest importers and dealers in European herring in New York has kindly forwarded me a *pro forma*, settling of accounts, by which can be seen what expenses the European herring is submitted to when exported to New York on consignment. He takes for this purpose a shipment of 1,000 one-sixteenth kgs. and 100 barrels of Dutch herring.

SALE:—1000—1-16 kegs				-	-	-	-	0.70 cts.—\$700.00	
100—				brl.	-	-	-	\$9.00 cts.—900.00	
									\$1600.00
EXPENSES:—Freight paid in advance:									
Cartage of kegs at				1½ cent.	-	-	-	-	\$15.00
Cartage of brls. at				20 cent.	-	-	-	-	20.00
Duty 1000 kegs at				7 cents	-	-	-	-	70.00
Duty 100 brls. at				120 cents	-	-	-	-	120.00
Custom-house clearance each invoice					-	-	-	-	5.00
Brokerage, 1000 kegs at				2 cents.	-	-	-	-	20.00
Brokerage, 100 brls. at				25 cents.	-	-	-	-	25.00
Coopering and bona fide expenses					-	-	-	-	9.00
Storage and Insurance for one month					-	-	-	-	20.00
Commission at 5 per cent.					-	-	-	-	80.00
									\$ 384.00
Net dividend,									<u>\$1216.00</u>

This makes \$543.50 for the kegs and \$672.50 for the barrels, or 54½ cents per keg.—\$6.72½ per barrel net.

The storage and insurance are generally charged with 10 cents per barrel of herring, the first month; and 6 cents in the second month.

SCOTCH HERRINGS IN THE STATES.

The import of Scotch herrings to the United States is yet limited, but a few thousand barrels have been imported and sold at favorable prices; and as the Scotch are working hard to get their herrings introduced into the American markets, no doubt by continued shipping of the finest and best cured herring, they, after a time, will gain markets and increase their export. A Scotch barrel of herring contains about 250 pounds of fish, exclusive of pickle, and from 700 to 800 large herring with milt and roe. I have been informed that Scotch crown full herring has been sold in New York at 9 and 10 dollars per barrel, according to quality and packing.

NORWEGIAN HERRINGS IN THE UNITED STATES.

The export of herring from Norway to America is estimated to be of late years from 15,000 to 20,000 barrels. The most of this is exported to New York. The demand is mostly for fat herring classified as K.K.K. and K.K. (respectively from 10½ to 12½, and from 9½ to 10½ inches in length). The prices vary from \$8 to \$10.50, according to quality and demand. The larger brands of winter and spring herring have not found a ready market yet. The season for consumption of Norway herring is also from the 1st of September to the middle of November, and from the first of February to the middle of April.

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Besides herrings there are also from 1,500 to 2,000 barrels of sprats, and from 2,000 to 3,000 half-barrels of anchovies exported annually to New York from Norway. The sprats fetch from 4 to 5 doll. per brl., and the anchovies from 5 to 6 doll. per half-barrel. A Norwegian barrel of herring weighs 100 kilogram (220.5 pounds net, exclusive of pickle). Every shipment of herring to the United States, from Europe, should be followed by an invoice in duplicate, certified by an American Consul in the country from which the goods are shipped, and forwarded to the consignee in order to reach him before or at the same time as the goods arrive at its place of destination. Unless such a certificate is presented from an American Consul, the herring will not be delivered from the Custom House, but ordered to be stored to general order, which causes unnecessary increase in duty and storage expenses.

All herring exported to the States ought also to be covered fully with insurance (the amount of invoice with addition of 15 to 20 per cent imaginary profit) in order to protect the consignor, not alone against total loss, but also against expenses in case such accident should happen to the vessel in which the goods were shipped, that the cargo had to bear its share of expenses of what damage the ship may receive. When goods are shipped the consignee ought also to be made acquainted with the name of the company with which the cargo is insured and who the agent is for such company in the United States, or in the place to which the goods are shipped.

NORWEGIAN HERRINGS IN EUROPEAN MARKETS

To the European markets the herring is also mostly shipped in consignment. The prices vary much according to quality, supply and demand. Russia was formerly a great market for herring of inferior quality, but after the duty on imported herring was raised some years ago from three to about seven shillings and sixpence sterling per barrel, it does not pay to export cheap herring to that country. Should the proposed increase of duty (about 17s. stg. per brl.) take place, the Russian markets for herring will be entirely closed against foreign exportation. The large quantity of poor but cheap Swedish herring caught on the coast of Bohuslan (Sweden) which of late years are pushed into the continental markets in large quantities, threaten also to press down the prices of the better quality and cure. For these reasons the American markets have also been sought after and the export to that country of the best qualities and cure of herring is gradually increasing every year. The prices paid for the different kinds of herring in the continental markets can be found in the fish trade Gazette, issued every week in London, England, and widely circulated in Newfoundland.

In order to compare the expenses charged on herring shipped for instance on consignment to Hamburg, with those in New York, I shall quote the rates charged by the consignees in Hamburg:

Import duty	marks—1,700	
Wharfage and labour.....	"	0 15 per barrel.
Lighterage	"	0 20 "
Cooperage, salt, hoops & packing.	"	0 60 "
Cartage	"	0 20 "
Storage and insurance.....	"	0 25 "
Brokerage	"	0 60 "

The discount on the total value of the herring (consignment) charged is $1\frac{1}{4}$ per cent. One mark is equal to one shilling sterling.

SMALL HERRINGS.

Of late years a market has been worked up in Europe for very small herrings, which are exported in salt condition either whole or cut and dressed, from Norway to Germany, Galicia, Hungary and Austria, where they are prepared as Russian sardines. When dressed, the head is cut off and the herring ripped down in the abdomen. After the entrails are removed they are cleaned and salted heavy in barrels, in which state they are allowed to remain about a fortnight. After this time they are repacked tight in barrels with no salt except a little put in the bottom and on the top of the barrels. After these are headed up, they are supplied with pickle made of clean salt. The length of these herring is six and seven inches, when cut, reckoned from the tip of the tail-fin. The barrels contain 120 kilogram (264.5 pounds of fish.) The price obtained last year in Hamburg for these herrings, when cut, was from 21 to 26 marks per barrel cif, and 15 marks for not cut nor dressed herring. Last year these herrings were scarce in the markets and the demand pretty brisk. It would be worth while to try the export of such herring from Newfoundland, where they can be obtained in large quantities during the summer time in many of the large bays. The system of dressing them where cheap labor could be employed would certainly yield the best profit.

HERRRINGS PRESERVED WITH BORACIC ACID.

The preservation of fresh herring in boracic acid has of late years been much in use in Norway and Sweden, and large quantities are exported yearly to England, where this herring is mostly used for smoking purposes. Some years ago herring was preserved for bait purposes in the same way, but it proved to be a failure. The fish would not take the herring preserved in boracic acid. The herring,

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when preserved in this manner, must be perfectly fresh and free from injurious food, rinsed in clean water and packed in barrels, in layers, the same way as the salt herring is packed; over each layer is sprinkled a little of the boracic acid, mixed with table salt or fine Liverpool salt. To each barrel should be used 1.1 pound of boracic acid, mixed with 4.4 pounds of salt. The barrels should be filled with herring until about two inches below the cross, and headed up immediately after the herring are packed, and the empty space in the barrel filled with fresh, clean water. It is recommendable to roll the barrels around a few times every day the first three or four days after the herring is packed, in order to hasten the absorption of the boracic acid. Herring treated this way will keep fresh in the winter time for 3 or 4 weeks.

SMOKED HERRING.

In Europe the largest quantities of herring are smoked in Great Britain and Holland. The most suitable article for this purpose is full herring, which always obtain higher prices than the spent herring. On the Continent a middle-sized smoked herring is considered better than a large herring. The smoking-houses are all built on the same principle, but vary in size, the largest being in England. The Dutch smaller ones consist of a long one-storey house, built of brick and divided into many small rooms, each generally from 12 to 15 feet deep, 9 to 15 feet wide, and from 10 to 12 feet high from the floor to the lower part of the roof, which generally is a sloping one. Along the one side of the smoke-house is built a balcony, with a door in each end, and furnished with a separate roof and windows along the side. From this balcony, which is used as a work-room and store-room, a door leads into each smoking-room. Some of the large smoke-houses are built in such a manner that a wide hall-way runs right through the whole length of the building in the middle, and the smoke-rooms are placed on each side of the hall-way. The walls of the hallway are then made higher than in the smoke-rooms, and furnished with a separate roof and windows on both sides, above the roof of the smoke-houses, in order to bring sufficient light in the hall-way, which is used as the work-room and store-room. The doors to the smoking-rooms are generally divided in two, so that the lower part of the door can be opened and used for the regulation of the draft during the process of smoking, while the upper door is kept shut. Each room is also furnished with a small window placed close underneath the roof, which is used as a ventilator, and at the same time brings light into the smoke-room. The floor, as well in the working room as in the smoking-rooms, consists of brick. In each smoke-room is placed horizontal lying beams, about three feet apart and six feet above the floor, which run parallel with the partition walls. Upon each of these beams are

raised uprights about $3\frac{1}{2}$ or 3 feet apart, which reach right up to the roof. On each side and across these uprights are fastened laths, about 10 inches apart, upon which the sticks the herring are stuck on are placed. In the balcony, or hall-way, similar raft-work is also erected, which is used for storage of the smoked herring. In a smoke-room 12 to 15 feet, about twenty barrels of herring can be smoked at the same time.

ENGLISH SMOKE ROOMS.

The English smoke-houses are about twice or three times larger than the Dutch and much higher, but are built on the same principle. The raftwork in the smoking rooms commences also in the English smoke houses about six feet from the floor. In connection with the smoke-house is generally built an additional two story building, which is used as a workshop for dressing, salting and packing the herring. There are doors leading into the smoking rooms from the first and second flat of this building, the herring generally being brought into the smoke-rooms from the first flat and taken out when smoked through the doors in the second flat. Each smoking room is furnished with two or three small windows, the one above the other, and ventilators in the roof to bring forth the required draught of air to keep the fire burning. The herring, as a rule, are brought to the smoking houses in fresh condition and salted or pickled in the workshops, while the Dutch herring generally are salted on board of the vessels before they are brought to the smoking-houses, and have to be soaked before they are smoked. The stuff used for smoking purposes in Holland is dry chips of oak and sawdust of the same kind of wood, to smother the fire with. When oak chips are scarce other sorts of foliferous wood is used, such as poplar, birch, ash or elm. In England, as a rule, a mixture of the above-named sorts of wood is used, but instead of chips, boughs are mostly used. The fire is kindled in small heaps scattered around on the floor in the smoking-rooms.

ENGLISH BLOATERS, KIPPERS AND RED HERRINGS.

The English smoking-houses prepare chiefly three kinds of smoked herring—bloaters, kippers and red herring.

1 BLOATERS are prepared from fresh herring, which are put in strong pickle for six or seven hours, and afterwards washed in clear water, in order to liberate the herring from its scales. After being washed, it is threaded on thin sticks through the gill-lids, and again rinsed or dipped in water, before being hung up in the smoking-rooms, where they are smoked from ten to twelve hours, with a temperature on an average of 78° Fahrenheit. Bloaters are calculated on immediate

consumption, and are not durable more than three or four days. In threading the herring on the stick, the left gill-lid is opened and the stick pushed right through. Bloaters have a light yellow color. Sometimes bloaters are prepared of salted herring, and in such cases they are soaked for 48 hours in fresh water and smoked about twenty hours. Those herring are mostly consumed among the poorer class of people in the West part of England. The principal market for the real bloaters is London, to where they are shipped in boxes, each containing from 60 to 80 bloaters. Bloaters are sorted in—best full, mixed, shot and tents. The last named are herring which have fallen down and are broken or headless. These are packed, as a rule, in half boxes. Bloaters are also sold by the hundred.

2 KIPPERS: These are split through the back like the way in which the Americans split their mackerel. This operation is generally performed by women. After the herring are split, they are rinsed well in a vessel filled with clean water, and then put in strong pickle made of Liverpool salt, in another vessel, where they are allowed to remain for 15 minutes, after which time they are taken up, and put into troughs furnished with an iron stand in each end, and holes in the bottom. Into these iron stands are placed small square pieces of wood, furnished with hooks, and each herring taken from the trough is hung up by the gill-arch on two hooks. When the sticks are filled with herring, they are brought into the smoking-rooms, and hung up or placed on the raft-work, and this operation repeated, until the whole quantity are dealt with. Kippers are smoked in 12 hours, in an average temperature of 82° fahr., for speedy consumption. But if they are going to be kept for some time they must be smoked at least 24 hours. The fire is made of a mixture of oak, larch-tree, beech, elm and birch, and renewed every third hour. Well-smoked kippers have got a straw colour on the skin side, and a light brown colour on the inside. They are consumed in large quantities in the interior of England and are packed in the same kind of boxes as the bloaters, each box containing 70 kippers, and sorted in two qualities, 1 best-selected kippers, 2 second quality kippers. The boxes are made of $\frac{1}{4}$ inch spruce or pine lumber the end pieces being $\frac{3}{4}$ inch thick. The dimensions are $11\frac{1}{4} \times 9\frac{1}{2} \times 4\frac{1}{2}$ inches.

3 RED HERRINGS are also mostly prepared of fresh herring, which is salted dry on the floor in the salting room, connected with the smoking house, and allowed to remain in the salt 2 to 6 days, according to the length of time they are intended to keep and according to markets, for which they are prepared. After being left a sufficient time in salt, they are rinsed in clean water, and then threaded on sticks in the same way as the bloaters, and hung up in the smoking rooms, where they are smoked for about four weeks. If high dried are wanted, the

time of smoking is about six weeks. The red-herring are smoked with a smaller fire than bloaters and kippers, made of chips of oak and sawdust, and the fire only renewed once every day. The average temperature in the smoking rooms is kept at about 62° Fahrenheit. Sometimes redherring are prepared from herring which has been pickled in large cisterns. These are soaked in fresh water before they are hung up to be smoked, but otherwise treated in the same manner as the dry salted red-herring. The pickle salted, are called Scotch-reds, and are lower in price than the dry salted herring. Herring which have fallen down, or are headless, are smoked on the same sticks of wood as the kippers, and is called "red-tenters" and "plucks."

EXPORTATION OF RED HERRINGS.

A considerable quantity of red herrings are exported to Italy packed in 1 and $\frac{1}{2}$ barrels which hold about 1 brl, 500 herring and $\frac{1}{2}$ brl. 200 herring. These herrings are of the common brown smoked color. Light-colored red-herring are mostly consumed in the large manufacturing towns in England, while the dark-colored, such as ham-cured and black herring, mostly go to London and the Colonies. The stronger the herring needs to be smoked, the higher or nearer the roof it is hung in the smoking-rooms. Red-herring for shipment to the different parts of England are packed either in boxes of the same kind as is used for bloaters and kippers, or in kegs 10 inches high, 11 inch in diameter at the bottom, and 13 $\frac{1}{2}$ at the top, which hold from 80 to 100 herring. They are sorted as first and second quality, and as "tenters" and "plucks."

HOLLAND :—In this country the most herring is prepared as Red-herring (Bokking). The most of this herring is as formerly stated, caught in the North-sea, and salted round, on board of the vessel, in barrels. After they are brought to the smoking houses the barrels are opened, and the herring put into large vessels to be steeped in fresh water. The length of time in which the herring are steeped depends upon the different markets for which it is prepared. For the local markets Antwerp and Brussels, it is steeped for two days, while for the Italian markets the herrings are steeped one day, and sometimes not steeped at all, but only washed. In order to liberate the herring as much as possible from scales, it is stirred about several times during the day with a stirring pole. Herring which are salted heavy or have remained in salt over the ordinary time, are first steeped one day; then taken up and put in baskets for twelve hours, and after this again steeped another twenty-four hours. After the herring is sufficiently steeped the water is drawn off and the herring sorted and put in baskets, which contain about half a barrel, and is left in these in the balcony for 18 to 24 hours. The object of this is that the herring, by its own weight, in the

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baskets, shall press out some of the water, and serve instead of drying, and thereby facilitate the smoking. Subsequently the herring are threaded on willow-twigs, as in England, and brought into the smoking room, where they, in the mean time, until they can be hung up in the raft-work are placed on stands made for that purpose. When hung up to be smoked, the fattest, and such herring as are to be smoked strongest, are placed nearest the roof. The fire is made on the floor in a dozen small heaps (according to the size of the room) in each room, and chips of oak are generally used for that purpose, if it possibly can be obtained; if not, a mixture of poplar, ash, elm and birch. Saw dust of oak is applied in order to smother the fire and keep it from flaming; also to form a good body of smoke. After the fire is kindled, the small windows close to the roof, and the lower part of the door are kept open, in order to give a better draught, and also to give the dampness from the herring a chance to escape. The fire is renewed whenever the glowing chips are getting low. When the water after a couple of hours has evaporated from the herring, the small windows close to the roof, and the lower part of the door are shut, if sufficient draught can be had through the ventilators in the roof. The temperature is kept as near 65° fahr. as possible and is regulated by opening and closing the small windows and the doors as in the English smoking houses.

MARKETS FOR THE HOLLAND SMOKED HERRINGS.

Herring prepared for the two principal markets, Antwerp and Brussels, is generally smoked for 12 hours, and supposed to keep good for two weeks. These markets want the herring to be lightly smoked, and of a bright bronzed colour. Herrings prepared for Germany, Italy and other Belgian parts are smoked for 24 hours, and supposed to keep good from one month to six weeks. They are dark coloured. After the herring are smoked the small windows and the doors are opened, and the herring left to cool, either in the smoking rooms, or in the balcony in the raft-work erected there, for a couple of hours, before it is packed. The herring is packed in baskets made of willow-twigs 28 inches long, 17 inches wide at the top, and 12 inches at the bottom, the height about 7 inches, containing 200 each, for the Belgian, German and home markets; while for the Italian markets, boxes and drums made of soft wood are used. The boxes are 21½ inches long 12 inches high and 9½ inches wide, and hold about 200 herring. The drums are 20 inches high and 12 inches in diameter and contain from 300 to 400 herring. The herring is packed slantways, back down, across the boxes or baskets, with the exception of the two uppermost layers, which are packed back up. The packing in the drums is just the same as the common packing in barrels. As a rule a little straw is put in the bottom of boxes and baskets.

The bowed basket-lid is sewed fast by the help of long needle and twine. The herring are sorted for the Belgian and German markets in full and spent, with no regard to size. For the Italian markets they are sorted in large, full, medium full, and spent herring. Of the large full it takes about 300, of the medium about 400, and of the spent about 370 to fill a drum of the above-mentioned dimensions. Besides the herring caught in the north sea and treated and smoked in the manner described, a lot of smaller herring caught in the Zuider Sea is also smoked for local consumption. These herring are generally brought to the smoking houses fresh, are pickled in strong pickle for about one hour, left in the baskets to dry a while and smoked for 8 to 4 hours. The smoking of herring for export to foreign countries has not been carried on in Europe to any extent in other countries than Great Britain and Holland, until of late years, when a lot of this article has also been exported from Norway and Sweden. According to the report from the Swedish government fish-agent in London, the import in 1883, to that city, from Norway, was 133,595 boxes of kippers, and from Sweden, 2,007 boxes of kippers.

This only serves to show how great the consumption of smoked herring must be in Great Britain, where the London market alone, besides the enormous quantities of English smoked herring, can also find ready sale for large quantities of foreign imported articles. It is therefore probable that also smoked herring from Newfoundland could find a profitable market in England. An experiment in that direction would be interesting and worthy of a trial, more so, because the best demand for smoked herring is in the winter time; and this would suit the winter herring fishery in Placentia and Fortune Bay, where the herring can be had cheap and in large quantities.

A. NIELSEN.

ST. JOHN'S, NEWFOUNDLAND, }
April, 1890. }

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